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MISCELLANEOUS.

General.

724. ANON. 581.9
Centenary of the Royal Botanic Gardens, Kew.
Kew Bull., 1941, No. 3, pp. 201-9.
 The completion of the first hundred years of Kew Gardens is noted. Many congratulatory messages received are recorded and an account of the gardens and their growth is reprinted from *Country Life*. [It is understood that since the issue of No. 3 of 1941, publication of the bulletin has been suspended until the end of the war.—ED.]

725. ENGLEDOW, F. L. 63
Science and the land.
Chemistry and Industry, 1942, 61 : 239-45.
 The Jubilee Memorial Lecture of the Society of Chemical Industry. An account of the struggle of man to provide himself with food, shelter, clothing and luxuries. It is shown how the struggle intensifies as the population increases and the standard of requirements is raised and how with the aid of science man has so far proved comparatively successful. Many of the scientific principles involved and the methods of their application are discussed.

726. HILL, A. V. 63
Scientific research and development in the Empire.
Nature, 1942, 149 : 653-6.
 An account of recent progress made towards the co-ordination of scientific research in the Empire, with brief mention of some of the immediate needs and a note of the bodies in the different Dominions already co-ordinating research in those countries, with a strong plea for the closest co-operation with similar bodies in the U.S.A.

727. ANON. 63
Science and practice in agriculture.
Nature, 1942, 149 : 722-3.
 A condensed report of a discussion on "The better dissemination of scientific knowledge among British farmers" held by the Parliamentary and Scientific Committee.

728. EDITORS, *CHRONICA BOTANICA*. 633/635(072)
 Plant science institutions, stations, museums, gardens, societies and commissions in Central and South America.
Chron. bot., 1942, 7: 49-61.

Contains a large number of addresses of plant science institutions, etc., both public and private. The divisions, departments and sections of the more important institutions are named.

729. SECRETARIAT DES PAYSANS SUISSES. 63: 338
 Recherches relatives à la rentabilité de l'agriculture pendant l'exercice 1939/40, I et II. (Agricultural returns and economics in Switzerland from March 1939 to February 1940, parts I and II. (In French and German.)
Ann. agric. Suisse, 1941, vol. 42 (=Landw. Jb. Schweiz., 1941, vol. 56) pp. 1-62, 455-578.

A comprehensive, detailed account of agricultural capital outlay and returns of all the different branches of Swiss agriculture and animal husbandry in 1939/40.

730. STOUGHTON, R. H. 663.61: 581.084.1
Soiless cultivation. A review of recent progress.
Agriculture, 1942, 49: 25-9, bibl. 8.

Past work on the cultivation of plants in liquid nutrient solution or in a permanent inert medium sub-irrigated with nutrients is discussed. Experiments at Reading University are continuing on a much larger scale than hitherto and will test, among other things, the effect of heating the solution in the sub-irrigation culture of tomatoes and the chemical testing of the solution by simple colour tests by which means its composition might be readily controlled.

731. PARODI, L. R. 633/635(82)
La agricultura en la Republica Argentina. (Agriculture in Argentina.)
Chron. bot., 1942, 7: 19-23, bibl. 15.

Agriculture is the basis of Argentine prosperity. In this paper all the commercial crops are reviewed in turn, mention

being made for each crop of the extent of the area under cultivation, the districts in which it is grown and any features of interest that it may present. It is clear from the information supplied that a great number of crops can be successfully grown and that the agricultural possibilities of the country are almost boundless.

732. SKÖTTSBERG, C. 581.9(939)

The Falkland Islands.

Chron. bot., 1942, 7: 23-6, bibl. 4.

The flora of the Falkland Islands is described. Agriculture is insignificant, cereals rarely ripen but many vegetables do well. The main industry is sheep farming and this has already caused notable changes in the vegetation.

733. PENNINGTON, C. E. 016: 63

List of bulletins of the agricultural experiment stations for the calendar years 1939 and 1940.

Misc. Publ. U.S. Dep. Agric. 459, 1942, pp. 86, 15 cents.

This bulletin contains a title index under each experiment station, an author index and a subject index.

734. BONSMA, J. C. 635.976

Useful bushveld trees and shrubs.

Fmg S. Afr., 1942, 17: 226-39, 259.

A well illustrated article describing various trees and shrubs of the South African bushveld, their possibilities as indicator plants and their nutritional value as feed for grazing stock. In each case the protein content is quoted and is usually found to be high.

735. SMITH, R. M. 633.2: 635.977.8

Some effects of black locusts and black walnuts on south eastern Ohio pastures.

Soil Sci., 1942, 53: 385-98, bibl. 14.

Evidence is produced to show that many of the prevailing pastures of south-eastern Ohio are improved by the presence of widely spaced black locust trees and black walnuts. [Presumably *Robinia pseudacacia* and *Juglans nigra*.—ED.]

736. KEEN, A. 631.51

Physical research on problems of soil cultivation.

Endeavour, 1942, 1: 52-63.

KNOBLAUCH, H. C., KOLODNY, L., AND BRILL, G. D. 631.459

Erosion losses of major plant nutrients and organic matter from Collington sandy loam.

Soil Sci., 1942, 53: 369-78, bibl. 5.

GARSTKA, W. U., AND MILLAR, C. E. 631.459

A year's record of rainfall run-off and soil erosion at Michigan State College.

Quart. Bull. Mich. agric. Exp. Stat., 1942, 24: 199-205.

THOMAS, A. J., AND LANGLANDS, I. 634.928.4

Building-frames, timbers and sizes.

Pamphl. C.S.I.R. Aust. 112; being *Tech. Pap. Div. For. Prod.* 36, 1941, pp. 45, bibl. 28.

Nutrition.

737. NICOL, H. 581.12

What the plant does with its materials.

Nature, 1942, 150: 13-5, bibl. 14.

Substance of a lecture given before the London and South-Eastern Counties Section of the Institute of Chemistry, 15 April, 1942.

738. WHITE, P. R. 578.083

"Vegetable dynamicks" and plant tissue cultures.

Plant. Physiol., 1942, 17: 153-64.

A discourse on how tissue cultures are helping to solve fundamental problems.

739. GLASSTONE, V. F. C. 581.12/13

Passage of air through plants and its relation to measurement of respiration and assimilation.

Amer. J. Bot., 1942, 29: 156-9, bibl. 3.

Seventeen species of plants were found to permit the passage of air through their tissues from root to leaf and vice versa. Age, size and moisture conditions appeared to affect the rate of passage. With tobacco very high rates of air passage were demonstrated with almost undetectable changes of pressure. The importance of this phenomenon in connection with the measurement of quantities of gases liberated by plants is pointed out.

740. BALLARD, L. A. T. 581.12/13

The depressant effect of carbon dioxide upon photosynthesis.

New Phytol., 1941, 40: 276-89, bibl. 19.

The investigations were made on cotyledons of *Ricinus communis* and leaves of *Ligustrum vulgare* and the different behaviour of the two types of material is discussed.

741. GAVRILOV, K. I. 581.148.2

Some data on the causes of formation of the catarization layer before the fall of leaves.

C.R. Acad. Sci. U.R.S.S., 1939, 23: 726-9, bibl. 13.

The author's experiments at the Perm Medical Institute in 1937 and 1938 on *Fraxinus excelsior* lead him to the following conclusions. 1. Leaf fall is a complex biological process. Under the influence of increasing changes in a whole set of internal and external factors profound changes occur in the organism of the plant; these changes lead to the formation of the abscission layer and so to leaf fall. 2. Formation of this layer is connected with the accumulation of the B group of hormones in its vicinity. 3. As leaf fall draws near the relative amount of the B hormone rapidly increases in the region of the abscission layer; it reaches its maximum and is maintained at a rather high level throughout the period of leaf fall.

742. BARANOV, V. I. 539.16

Assimilation of radioactive elements by plants.

C.R. Acad. Sci. U.R.S.S., 1939, 24: 951-4.

The test plants were the pea, lettuce, cucumber, flax and oat. They were grown in water and sand cultures supplied with the necessary nutrients and with varying concentrations of Ra, U and Ac containing radioactive elements. The absorption of these elements is discussed.

743. BHASKARAN, T. R., AND PILLAI, S. C. 631.847

Fixation of atmospheric nitrogen in living forms.

Indian J. agric. Sci., 1942, 12: 178-239, bibls. 477 and 35.

A review of the work and discoveries on the fixation of atmospheric nitrogen by bacteria and plants from 1862 to the present day. Attention is called to the comprehensive bibliographies.

744. SHCHEPOTIEV, F. L. 612.014.44: 581.14

Growth of woody plants as affected by curtailed day length.

C.R. Acad. Sci. U.R.S.S., 1939, 23: 722-5, bibl. 10.

Short day treatments, i.e. restriction of light to 6 hours for 5 days, for 10 days, for 20 days, for 105 days and to 9 hours for 5 days and for 10 days were applied to *Ailanthus glandulosa* and *Morus alba* seedlings within a few days of their emergence from the soil at Kharkov. Considerable beneficial effect on amount of leaf growth was observed following the 6- and 9-hour treatments for 5 and 10 days. This was particularly noticeable in the 2nd year after treatment. The average number of seedlings given the particular treatments in each case or acting as control was 20.

745. MOSHKOV, B. S., AND KOCHERZHENKO, I. E. 631.535: 581.144.2: 612.014.44

Rooting of woody cuttings as dependent upon photoperiodic condition.

C.R. Acad. Sci. U.R.S.S., 1939, 24: 392-5.

Work with *Salix* spp. in their experiments at the All Union Institute of Plant Industry, Pushkin, led the authors to the following conclusions. The relation between the rooting power of shoots and the photoperiodic conditions experienced by the parent plant, as well as differences between species in this character, are essentially determined by the processes involved in the growth of the plant and its transition to dormancy. In northern latitudes some species, especially those of southern origin, produce shoots which root poorly, if at all, since they fail to complete growth under these conditions and to reach the physiological state indispensable for rooting. The rooting ability of the shoots of such species can be greatly enhanced by growing them under short day conditions. Light conditions are also a very important factor in providing the shoots which have to root in summer with plastic substances. Generally speaking, the best method of preparing the way for successful rooting of shoots is to grow the parent plant under photoperiodic conditions which are optimum for its life activity. This applies both to deciduous and evergreen species such as citrus. At the actual time when root formation is wanted, it is best induced in most species by continuous illumination.

746. GILBERT, S. G., AND SHIVE, J. W.

631.433: 581.11

The significance of oxygen in nutrient substrates for plants. I. The oxygen requirement.

Soil Sci., 1942, 53: 143-52, bibl. 6.

A method is described for maintaining approximately a constant oxygen concentration in the nutrient solution. The method permits a quantitative study of the relationship of oxygen tension to plant growth. It is indicated that the optimum oxygen supply for maximum yield of certain agricultural species (experimental plants were soybean, tomato, oat) is not attained by the saturation of the nutrient substrata by air but is reached with a higher partial pressure of oxygen than is present in the atmosphere. [From authors' summary.]

747. WHETSTONE, R. R., ROBINSON, W. O., AND

BYERS, H. G. 631.416.8: 546.27

Boron distribution in soils and related data.

Tech. Bull. U.S. Dep. Agric. 797, 1942, pp. 32, bibl. 51, 10 cents.

Methods are described for determining phosphoric acid-soluble, total and water-soluble boron in soils. The findings in 300 soil samples from different parts of the U.S. are discussed: boron was detected in all. The amount of boron depends on the soil parent material and on weathering. Soils derived from alluvium, limestone, shale and glacial drift are high, those from igneous rock and unconsolidated sediment low in boron. Leaching tends to decrease acid-soluble and concentrate acid-insoluble boron. Acid-soluble boron increases with increasing colloid content and with increasing soil pH. Injury to apples, alfalfa, celery and beets from boron deficiency in Oregon, W. Virginia and N. Carolina is associated with low boron content of the soil. Natural boron toxicity is unlikely except in arid regions. Toxicity from added boron is more likely on acid, sandy soils, often previously deficient in boron. [From authors' summary.]

748. BYERS, H. G. 581.192: 546.23

On the occurrence of selenium in plants.

Chron. bot., 1942, 7: 4-6.

The presence of selenium in the soil, its uptake by certain plants and its poisonous properties to cattle consuming them are among the subjects discussed. "Converter" plants are mentioned. These are plants to whose growth selenium

seems indispensable. They are considered by some investigators to obtain selenium from soils in which it is unavailable to other plant species and through their death and decay to render it available. Direct injury to humans in selenium areas is almost unknown. The injury from selenium in food or forage crops is limited to a decrease in their nutritional value with consequent lowering of the value of the land on which they stand.

749. OLSON, O. E., JORNLIN, D. F., AND MOXON, A. L.

631.811.9: 546.23

Field studies on methods for determining availability of selenium to plants.

Soil Sci., 1942, 53: 365-8, bibl. 6.

That the analysis of the plants growing in the soil seems to be the most practicable method of determining the available selenium in the soil is indicated from studies carried out at the South Dakota Agricultural Experiment Station.

750. PIPER, C. S.

632.19: 546.56

Investigations on copper deficiency in plants.

J. agric. Sci., 1942, 32: 143-78 + 7 plates, bibl. 40.

The essential nature of copper for plant growth is confirmed by experiments at the Waite Institute, Adelaide, in which oats, peas, flax, tomatoes and other plants were grown in nutrient solutions with and without traces of copper. Their deficiency symptoms are described. Other experiments in pots concerned the influence of soil factors on the availability of copper.

751. BEAUCHAMP, C. E.

581.192: 631.45

Composition of alcoholic leaf extract and the entire leaf of Irish potatoes as indices of soil fertility.

Plant. Physiol., 1942, 17: 165-78, bibl. 10.

The entire leaves of Irish Cobbler potato grown on differently manured plots were analysed for nitrogen, phosphorus, potash, calcium and magnesium and results were such as to show that analysis of the entire leaves and of the alcoholic leaf extract can be used as indices of soil fertility deficiencies or as indicators of the nutrition of the crop. It was noticeable that minus potash treatments resulted in a derangement of the N-P-K units in the leaf, characterized by a decrease in the K ratio and an increase in the N ratio. The fact that the alcoholic leaf extract showed a rather constant K-P ratio, irrespective of the widely different treatments, is very significant, indicating that there is a definite equilibrium between K and P in the synthetic processes of the leaves. On analysing entire leaves the no K treatments showed a very high P content in the leaves since, in the absence of K, the absorption of P increased, even though it was utilized only in proportion to the amount of potash available to equilibrate it. Both the alcoholic leaf extract and the entire leaves show the same sequence in the Ca-Mg-K relationships. When K was high, Ca and Mg individually and collectively were low and *vice versa*.

752. BINDLOSS, E.

576.31: 581.144.3

A developmental analysis of cell length as related to stem length.

Amer. J. Bot., 1942, 29: 179-88, bibl. 16.

COMAR, C. L., AND ZSCHEILE, F. P.

581.192: 535.33

Analysis of plant extracts for chlorophylls *a* and *b* by a photoelectric spectrophotometric method.

Plant Physiol., 1942, 17: 198-209, bibl. 5.

WOOD, J. G.

581.192: 546.22

Metabolism of sulphur in plants.

Chron. bot., 1942, 7: 1-4, bibl. 16.

FRANCK, J.

581.11/12

Carbon dioxide evolution during the induction period of photosynthesis.

Amer. J. Bot., 1942, 29: 314-7, bibl. 16.

GREULACH, V. A. 612.014.44
 Photoperiodic after effects in six composites.
Bot. Gaz., 1942, 103: 698-709, bibl. 13.

MANN, L. K. 612.014.44
 Effects of photoperiod on sex expression in *Ambrosia trifida*.
Bot. Gaz., 1942, 103: 780-7, bibl. 8.

OVERSTREET, R., AND OTHERS. 631.81.031
 Additional studies regarding the cation absorption mechanism of plants in soil.
Amer. J. Bot., 1942, 29: 227-31, bibl. 13.

ALBRECHT, W. A., GRAHAM, E. R., AND SHEPARD, H. R. 581.144.2: 631.414
 Surface relations of roots and colloidal clay in plant nutrition.
Amer. J. Bot., 1942, 29: 210-3, bibl. 7.

Propagation.

753. WENT, F. W. 577.15.04
 Plant hormones.

Reprinted from *Publ. Amer. Ass. Adv. Sci.* 14, 1941 (?), pp. 147-58, bibl. 43.

A detailed investigation in simple, though sometimes technical, language into plant hormones and the growth of our knowledge of them. Tables and diagrams are given showing:—the relative molar activities of the better known growth promoting substances; the reactions arising from some of these substances when directed to root formation; the relation between the various growth phenomena; the reactions involved in each phenomenon and some of the substances able to take part in these reactions; the reactions existing between root system, stem, old and young leaf and apical bud in a plant. It is noted that the evidence in favour of a chemical rather than a stimulus concept of growth and development is very strong. The essential similarity between growth processes in the plant and animal kingdom is emphasized. Finally the author points out that increased knowledge on the basic principles of plant growth has inevitably led to practical applications in agriculture and horticulture and that a distinction between pure and applied research is highly artificial: he urges that it should be dropped.

754. OVERHOLSER, E. L., AND OTHERS.

577.15.04: 581.14

Hormones, horticultural chemicals and vitamins as related to growth, fruit drop and color.

Proc. Wash. St. hort. Ass. 36th annu. Meet. 1940, 1941, pp. 128-42, bibl. 15.

Plant hormones appear to be produced in minute quantities in one part of the plant such as the young vigorous growing parts and to be then moved to other parts where they become active. The hormones stored in seeds are of the utmost importance in germination. Moisture and light, temperature, and localized chemical changes in plants, such as increased acidity, affect their occurrence and activity. The chief experimental source of auxin has been found in human urine. It is believed to be derived from consumed food, chiefly fats. This may afford a reason why liquid manure is so valuable to plants. Different theories exist on the possible effect of hormones on growth. Growth intensity is correlated with the differential distribution of hormones. They regulate the normal growth of plants by promoting cell enlargement in expanding organs. Under proper conditions growth substances may bring about the building of callus tissue in cuttings and the initiation of new roots. Prolongation of the growth period and prevention of petiole or stem abscission in fruits by auxins has also been demonstrated in several species. The treatment of the stigma of the musk melon with heteroauxin at the time of pollination has resulted in increased fruit production. The value of the following chemicals in stimulating growth is discussed: indolebutyric acid, indoleacetic acid, potassium

naphthaleneacetate, phenylacetic acid and α -naphthaleneacetic acid. Their use in the prevention of fruit drop is noted and results of trials are briefly reported. Further experiments described here indicate that some benefit as regards increased colour of fruit can be obtained without injury by spraying with certain insoluble thiocyanate sprays, but that injury is likely without increased effect from the use of soluble thiocyanate. It seems reasonable to suppose that the vitamins are as important in the growth of plants as in that of animals, but since plants synthesize them within their tissues they are probably always present and it is, therefore, difficult to determine the effect of the lack of vitamins on the plant. Brief notes are given on the effect of applying vitamin B₁ to various plants. Many species of plants, trees and shrubs more noticeably than quickgrowing annuals, respond to treatment by increased growth of roots and top. Farmyard manure is a good source of this vitamin and this may have something to do with its effectiveness.

755. BAUSOR, S. C. 577.15.04
 Interrelation of organic materials in the growth substance response.
Bot. Gaz., 1942, 103: 710-24, bibl. 34.

A close relationship between the carbohydrates and the growth substance in the anabolic metabolism of the plant cell is brought out by these experiments with tomato and kidney bean cuttings. While the removal of foliage of intact tomato plants and cuttings completely inhibited the small response in these plants to the growth substance in the dark the addition of sucrose produced the complete response obtained from plants in the light. Under the conditions of the experiment proteins apparently were resynthesized locally from other parts of the cuttings not directly affected by the growth substances. Cuttings in a minus-nitrogen solution responded as vigorously to the growth substances as did those with nitrogen. The reasons for this, including the re-utilization of nitrogen, are discussed. In practical work the pre-treatment of cuttings with a solution of an inexpensive sugar or sucrose before using a growth substance may induce more vigorous rooting and better subsequent growth. The most obvious cytological change in response to growth substances was the great increase in size of the nucleolus. The nucleolus diminished in size and disappeared under conditions of carbohydrate deficiency but did not change in plants grown in a sugar medium in the absence of growth substances.

756. FARRAR, J. L., AND GRACE, N. H.

634.975: 631.535: 577.15.04

Vegetative propagation of conifers. XII. Effects of media, time of collection and indoleacetic acid treatment on the rooting of white pine and white spruce cuttings.

Canad. J. Res., 1942, 20, Sec. C, pp. 204-11, bibl. 30.

The paper deals in greater detail with the experiments on rooting cuttings of *Pinus strobus* and *Picea glauca* already reported, *Ibidem*, 1940, Vol. 18, Sec. C, p. 612; *H.A.*, 11: 338 and Vol. 20, Sec. C, p. 116, noted *H.A.*, 12: 351.

757. LAPIN, V. K. 633.956: 547.944.6
 Production of an amphidiploid basil (*Ocimum canum* Sims \times *Ocimum gratissimum* L.) by colchicine treatment.

C.R. Acad. Sci. U.R.S.S., 1939, 23: 84-7, bibl. 3.

Treatment was applied to apical buds of rooted cuttings. Doubling of the chromosomes resulted and the crop collected from the amphidiploid plant consisted of more than 3,000 fruits. It is thought that an even larger yield might be expected in the next generation, which would disclose a method of propagating the eugenol-bearing hybrid basil by fruits instead of cuttings.

758. GLOTOV, V. 547.944.6

Effect of colchicine from *Colchicum umbrosum*
Stev. on the camphor basil.

C.R. Acad. Sci. U.R.S.S., 1939, 24: 502-4, bibl. 2.

The effect of colchicine from *C. umbrosum* was found to be physically, chemically and biologically (i.e. in its polyploid forming effects) identical to that derived from *C. autumnale*, the ordinary source of colchicine. The presence of certain impurities was noted, but these it is hoped to eliminate without difficulty.

759. KOBLET, R. 581.143.26.03 + 577.15.04

Die Beeinflussung des Pflanzenwachstums durch
Saatgutbehandlung. Sammelreferat. (The influence
of seed treatment on plant growth. A review.) [French summary.]

Landw. Jb. Schweiz., 1942, 56: 278-88, bibl. 49.

The author gives an account of work on vernalization, especially of cereal seed, on the treatment of agricultural seed with growth substances and of the practical value of the two processes to Swiss agriculture. He comes to the following conclusions: Vernalization trials in central, western and southern Europe show that though the treatment is of interest to the physiologist and selectionist it is of no practical importance to staple crop production in Switzerland. Further, the treatment of seed, either wet or dry, with growth substances or vitamins has given contradictory results. It is improbable that different substances can produce a general increase in crop returns. All that results to date justify is the hope that particular crops may possibly be induced to give greater yields under conditions which have still to be determined. In view of this and of the possible toxic effects of ill-considered applications of certain growth substances, seed treatment with growth substances on a large scale cannot be recommended without previous far-reaching experiments.

760. MOLOTKOVSKY, G. K. 631.541

Some results obtained in changing the nature of
plants by means of grafting.

C.R. Acad. Sci. U.R.S.S., 1939, 24: 602-4.

Trials were made of grafting potato on potato, Jerusalem artichoke on Jerusalem artichoke, hemp on hop, hop on hemp [unsuccessful], potato on tomato and Jerusalem artichoke, potato and dahlia on each other. Effects are noted.

761. FEDOROV, S. I. 635.655: 631.541

Effect of approach grafting when union has
failed. [Russian.]

Vernalisation, 1941, No. 2 (35), pp. 116-7.

Seeds of soya bean and yellow lupin were sown together in pairs and the seedlings grafted together by approach. No actual fusion of the tissues occurred yet the soya bean plants so produced were 32.4% greater in dry weight than ungrafted plants; the lupins were somewhat reduced in weight by the treatment but yielded more seed. The effect may be caused by the presence of root nodules on the lupins, since the soya plants formed no nodules, though the higher seed weight in the lupins suggests than an interchange of enzymes has also taken place. Buckwheat was grafted in a similar way on to pea and resulted in larger plants which flowered earlier. Again there was no fusion of tissues and yet an interchange of nutritive materials seems to have occurred.

762. PARHOMENKO, M. P. 633.854: 575.257

New developments in the grafting of herbaceous
plants. [Russian.]

Vernalisation, 1941, No. 3 (36), pp. 121-4.

The grafting of one variety on to the root system of another inevitably affects the functioning of this root system quantitatively and even qualitatively—e.g. it may select different mineral elements from the soil. Similar alterations will be brought about in the scion. Observations were made in 1939 and 1940 on grafts of Jerusalem artichoke on sun-

flower and vice versa. In the sunflower on artichoke graft all the sprouts which came up from the rootstock at the neck were removed immediately. No effects were observed on the scion in the first 2½ months. The rootstock formed tubers. In a second graft of sunflower on artichoke the latter was allowed to retain its own shoot system, which developed very luxuriantly, and was quite uninfluenced by the sunflower. The sunflower foliage, however, showed clear deviations in the direction of the artichoke type, the inflorescences were smaller, the petals were paler and flowering was 2 weeks later; the seeds were about a month later in ripening and the stems remained green until the winter. Plants obtained from these seeds were again grafted in the same manner; again there was a strong influence of the same type as in the previous year but to a more pronounced degree. It is thought that by continuing the process the sunflower characteristics could be almost entirely swamped. Grafts of artichoke on sunflower showed some influence of the sunflower provided the shoots were not removed from the stock, thus flowering was some 2 weeks earlier. Small tubers were formed by the sunflower, the largest being 9 mm. in diameter and 14 mm. in length, the majority having a diameter of only 2-3 mm. In order to exclude the assimilating activity of the stems, grafts were made of fruits upon fruits—e.g. melon on water-melon, etc. By using stainless steel cylinders differing in diameter by 0.5-1 mm. a small piece can be cut out of one fruit and placed in the cavity left in the other by the larger cylinder. Great success was achieved with such grafts on fruits 5-6 days after fertilization, when the cell activity was at its maximum. Any cucurbitaceous fruit can be grafted on to any other although not all combinations give seed; seed has only been obtained from grafts of one melon on another and of 100 lb. gourd on forage water-melon. Grafts were also made of young tubers of a pink Jerusalem artichoke on tubers of a white. These grafts were made in the form of a cone, cut out by means of a safety razor blade and placed in a boring made with a conical drill 12 mm. wide at the tip and 60-100 at the nose. All the grafts took excellently.

763. ANAN'eva, S. V. 633.854.78: 575.257

The mentor method applied to the sunflower.

[Russian.]

Socialistic Grain Farming, 1941, No. 2, pp.
118-33.

Alterations in grafted sunflowers were observed in respect of time of maturity. The vigour of the graft varied according to the vigour of the stock chosen, but particularly vigorous grafts were obtained on Hybrid No. 2, which shows heterosis but is not more vigorous in growth than some commercial varieties. Thus Saratov Early grafted on to this hybrid yielded four times as much as ungrafted plants. When variety 169 was grafted on to the perennial species *Helianthus mollis* changes occurred also in a number of morphological characters and in the form of the seeds. The first generation progeny from the various grafted plants were mostly more vigorous than the controls and some were earlier than either of the parental forms. The diameter of the inflorescence, yield of seed and seed weight were also greater in the progeny of grafted plants; there was a certain amount of variation in all these characters within each progeny. In husk percentage the progenies were intermediate and in oil content they were usually below the parent forms; this is ascribed to the removal of the leaves from the grafted plants. Some progenies of grafts on high oil-containing forms showed an increased oil content. When the dwarf sunflower (Karlik) or other inferior form was used as stock the reverse effects were observed. Sunflowers grafted on to Jerusalem artichoke had smaller leaves and inflorescences, were 36 days later in maturity and gave no seeds. The tubers on the rootstock were reduced in size but otherwise typical. The plants arising from them were again grafted with sunflower; this time the resulting tubers showed a number of alterations in form and colour and several of them bore roots on their surface. The resulting

plants segregated much in the same way as generative hybrids.

764. LAMMERTS, W. E. 581.145.2; 634.1/2
Embryo culture an effective technique for shortening the breeding cycle of deciduous trees and increasing germination of hybrid seed.
Amer. J. Bot., 1942, 29: 166-71, bibl. 13.

By the method of embryo culture hybrid trees (in this case peaches, nectarines and apricots) can be brought into flower in two years from the time of cross-pollination. Many embryos not responding to stratification can be successfully germinated by the embryo-culture methods. Embryo-cultured trees flowered and fruited earlier and more heavily than the control trees from stratified seeds, presumably because the application of cold treatment to satisfy the chilling requirements of seedlings from non-after-ripened seed produces these effects more abundantly than the same or even twice as much cold treatment applied to dormant seeds. The technique described is in use by the Division of Subtropical Horticulture, University of California, and is that of Tukey* with 6 modifications which have proved useful. Certain problems yet to be solved are discussed.

765. NORTHEN, H. T. 577.15.04

Relationship of dissociation of cellular proteins by auxins to growth.

Bot. Gaz., 1942, 103: 668-83, bibl. 81.

MOULTON, J. E. 577.15.04

Extraction of auxin from maize, from smut tumours of maize, and from *Ustilago zeae*.

Bot. Gaz., 1942, 103: 725-39, bibl. 22.

AVERY, G. S., JR., BERGER, J., AND SHALUCHA, B. 577.15.04

Auxin storage as related to endosperm type in maize.

Bot. Gaz., 1942, 103: 806-8, bibl. 2.

SCHNEIDER, C. L. 577.15.04

On the nastic and traumatic responses in the pea test.

Amer. J. Bot., 1942, 29: 201-6, bibl. 8.

WENT, F. W. 577.15.04

Growth, auxin, and tropisms in decapitated *Avena* coleoptiles.

Plant Physiol., 1942, 17: 236-49, bibl. 15.

RAKITIN, J. V., AND JARKOVAJA, L. M. 577.15.04

Relationship between the reaction (pH) of the medium and the activity of growth substances [as shown in the *Avena* coleoptile test].

C.R. Acad. Sci. U.R.S.S., 1939, 23: 952-4, bibl. 8

ZHDANOVA, L. P. 577.15.04

Mechanism of auxin formation in green plants.

C.R. Acad. Sci. U.R.S.S., 1939, 24: 505-8, bibl. 6

BROWN, N. A. 632.8

The effect of certain chemicals, some of which produce chromosome doubling, on plant tumours.

Phytopathology, 1942, 32: 25-45, bibl. 17.

Technique.

766. KEARNS, H. G. H. 631.3.083/084: 635.1/9
Garden tractors. I. Types and routine maintenance.

A.R. Long Ashton agric. hort. Res. Stat. for 1941, 1942, pp. 54-8.

Useful hints on the care and maintenance of garden tractors with special reference to exclusion of dust, lubrication, ignition and the implements used with the tractors.

* *H.A.*, 1933, 3: 147, 1938, 8: 390.

767. RICHARDS, L. A., AND LOOMIS, W. E. 631.548: 631.432
Limitations of auto-irrigators for controlling soil moisture under growing plants.

Plant Physiol., 1942, 17: 223-35, bibl. 14.

Experiments were made with 6-inch and 10-inch double-walled irrigator pots designed by Richards, in which maize, soybeans, wheat and oats were grown in various soils. It was found with low barostat tensions that good moisture control was attained while the plants were small and that there was no change in the average pot weight from day to day. With larger plants, however, with a daily transpiration loss of more than 100 ml. per day (350 ml. for the 10-inch pots) it was not possible to maintain the soil moisture content, even with supply water for the reservoir at tensions as low as 2 to 4 cm. of mercury. The reasons for this are discussed. The pots described appear to be definitely useful in soil moisture control problems which do not require the rapid movement of moisture through the soil.

768. JENNY, J. 536.58

Erfahrungen mit dem vollautomatischen Elektrobrückenthermostat "Wädenswil". (Improvements in the Wädenswil automatic electric-bridge thermostat.)

Landw. Jb. Schweiz, 1942, 56: 202-6.

An illustrated account of improvements made in the Wädenswil thermostat described *Ibidem*, 1938, pp. 913-32. *H.A.*, 9: 400. They include easier reading of the thermometers, better evacuation of condensation water, increased number of cells.

769. CHEDELIN, V. H., AND CHRISTENSEN, B. E. 578/579

A simple mechanical shaker.

Science, 1942, 95: 257-8, bibl. 10.

A description with diagrams of a simple mechanical shaker for use in the laboratory based on the use of an ordinary sewing machine head and driven by a 1/16 H.P. motor.

770. LINFORD, M. B. 581.144.2

A miniature root-observation box.

Phytopathology, 1940, 30: 348-9.

LINFORD, M. B.

Methods of observing soil flora and fauna associated with roots.

Soil Sci., 1942, 53: 93-103, bibl. 7.

The first paper describes a root observation box of such a size that it can be placed on the stage of a microscope and allows of effective observation at higher magnifications including not only the dissecting binocular but the lower magnifications of the compound microscope as well. The second paper describes how direct observations are possible at magnifications up to 900 diameters of organisms associated with roots growing in soil where roots are grown in contact with a glass coverslip. A number of photographs showing these organisms testify to the success of the method.

771. PARTRIDGE, N. L. 581.144.2

A container for growing plants for root studies.

J. Amer. Soc. Agron., 1942, 32: 907-8.

The containers are made from 22 gauge, unpainted galvanized iron. The upright portion is bent into shape on 3 sides and has a detachable 4th side which is slipped inside and kept in place by two flanges aided by metal screws inserted through holes pierced in flanges and side at 6 inch intervals. The container merely rests on a detachable metal bottom, pierced for drainage. The size illustrated is 10 x 10 inches and 4 ft. deep, but may, of course, be varied as desired. At the conclusion of the growing season the cans are dug up and the loose side removed, exposing the soil. Subsequent examination proceeds as required by the investigator.

772. GALL, D. C. 632.183
A recording wind direction indicator.
J. sci. Instrum., 1941, 18: 219-21.
 A recording wind indicator is described, in which the angular direction of the wind vane electrically controls an ink record at any distance. The record is in rectangular co-ordinates and provides for an overlap of 90° in the orientation of the vane to allow for fluctuations in wind directions. The mechanism to effect this overlapping record is described. [Author's summary.]

773. MILTHORPE, F. L. 581.45
A simplified photoelectric cell method for measuring leaf areas.
J. Aust. Inst. agric. Sci., 1942, 8: 27.
 The apparatus described and successfully used consists of a simple and inexpensive modification of the low light intensity device described by Hibbard and others (*Pap. Mich. Acad. Sci. Arts and Letters*, 1937, 23: 141-7).

774. SHARDAKOV, V. S. 581.45
A simplified procedure for measuring leaf area by means of a planimeter.
C.R. Acad. Sci. U.R.S.S., 1939, 24: 67-8.
 A simple device is described which, it is claimed, facilitates the quick and reasonably accurate measurement of leaf area by means of a planimeter. The result is obtained by directly contouring with the planimeter the leaf placed under glass.

775. PETROV, E. G., AND GAVRILOV, N. I. 581.45
Device for determining leaf areas.
C.R. Acad. Sci. U.R.S.S., 1939, 24: 499-501.
 A description of an apparatus for measuring leaves. Its reading is based on photometrical calculations on the intensity of light recorded in a chamber in the presence and absence of a leaf. The authors hope to overcome a certain unyieldiness at present noticeable.

776. GIBBS, R. D. 581.192
Studies in tree physiology. III. The effect of the method of cutting on the water content of twigs. A note on a paper by McDermott.*
Canad. J. Res., 1942, 20, Sec. C, pp. 236-40, bibl. 4.
 Significantly higher water contents are found in short samples of twigs isolated by simultaneous cuts than in samples isolated by consecutive cuts in which displacement of water obviously takes place. This is in agreement with

777. ISAACS, T. L., AND BROKER, T. C. 581.192
Application of the liquid extraction method for the determination of total organic acids in plant sap.
Plant Physiol., 1942, 17: 296-302, bibl. 13.
 The liquid extraction method for the determination of organic acids is reviewed and a design of the apparatus used is given. Its successful application to excised barley root sap is described.

778. MINISTRY OF AGRICULTURE, LONDON. 623.451: 633/635
Chemical effects of high explosive bombs on agricultural land.
Tech. Comm. Minist. Agric., Lond., 3, 1941, 1 p.
 Following examination of such bombs, which generally contain trotyl, the Ministry's advice is as follows:—When filling in craters—it is realized that the actual labour of filling in and levelling is the chief problem—(1) Soil tipped in crater and surrounded soil should be left loose giving easy access to air. Crater should be filled slightly above ground level. (2) Any available organic material should be incorporated in the top layer. (3) If possible the top layer should be a spit of good soil. (4) Any soil stained yellow or obviously contaminated should be deeply buried at the bottom or removed.

779. WOOLDRIDGE, W. R. 623.459: 613.2
The contamination of foods by poison gases. II.†
Food Manuf., 1942, 17: 123-6, bibl. 10.
 Methods of detection by chemical analysis.

MINISTRY OF AGRICULTURE, LONDON. 623.459: 633/635
Contamination of crops by war gases: effects and treatment.
Tech. Comm. Minist. Agric., Lond., 4, 1942, pp. 10.
 * *Amer. J. Bot.*, 1941, 28: 506-8, *H.A.*, 11: 1083.
 † Part I *Ibidem*, 17: 96, *H.A.*, 12: 698.

TREE FRUITS, DECIDUOUS.*

General.

780. READ, F. M. 634/635
Victorian horticulture. Today and tomorrow?
J. Aust. Inst. agric. Sci., 1942, 8: 12-7.

Comments are made on several branches of horticulture in the State of Victoria with reference to post-war employment and expansion. It is urged that a survey should be made now by the Government with a view to preventing the unfortunate consequences of a last minute rush as experienced after the war of 1914-18. The author criticizes the present schemes which even now in times of labour shortage are directed to keeping men in over-produced industries rather than to transferring them to alternative production. Suggestions are made as to crops and agricultural industries which could be profitably developed.

781. MOTZ, F. A. 634.1/8: 658.8
South America, competitor and customer.
Proc. Wash. St. hort. Ass. 36th annu. Meet. 1940, 1941, pp. 51-71.

The countries considered in this article as possible competitors of the Washington fruit grower on world markets are

the results of McDermott.* Natural water gradients are small and do not invalidate McDermott's figures. Displacement is not confined to the immediate neighbourhood of the cut.

777. ISAACS, T. L., AND BROKER, T. C. 581.192
Application of the liquid extraction method for the determination of total organic acids in plant sap.
Plant Physiol., 1942, 17: 296-302, bibl. 13.

The liquid extraction method for the determination of organic acids is reviewed and a design of the apparatus used is given. Its successful application to excised barley root sap is described.

War.

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Tech. Comm. Minist. Agric., Lond., 4, 1942, pp. 10.

* *Amer. J. Bot.*, 1941, 28: 506-8, *H.A.*, 11: 1083.

† Part I *Ibidem*, 17: 96, *H.A.*, 12: 698.

* See also 1070-1077.

American products. The possibilities, which are discussed, of any of these countries affording good markets for Washington fruits appear small.

782. FJÄDERHANE, M. 634.1/7-1.16
Värdering av frukträd. (Valuation of fruit trees.)

Sverig. pomol. Fören. Arsskr., 1940, 41: 49-71.

The author discusses methods of evaluating fruit trees. Among points which in his opinion must be considered are:—
1. *Natural potentialities*. Distribution of yield through the growing period. Varieties and fruitfulness. Location of trees. Soil. Interculture. Suitability of stock and scion for locality. Management. Distance of planting. Whether topworked or not. Manurial practice. 2. *Economic potentialities*. Planting costs. Annual management costs. Kemmer-Reinhold's method of evaluation. Establishment value. Period of fruitfulness (30 years according to Kemmer-Reinhold).

783. VAN METER, R. A., AND SHAW, J. K. 634.11

Apple varieties in Massachusetts.

Ext. Leafl. Mass. St. Coll. Ext. Serv. 42 (revised), 1940, pp. 20.

The present tendency in New England apple orchards is to plant McIntosh with pollinizers, Baldwin being next on the list. The characteristics of these and 31 other varieties available are here set out and notes are given of 21 new varieties, many of which are bud sports.

784. MÖCKEL, W., AND WOLFF, J. 634.11: 581.192: 577.16

Über den Ascorbinsäuregehalt deutscher Apfelsorten. (Vitamin C in German apples.)

Gartenbauwiss., 1941, 16: 188-94, from abstract *Forschungsdienst*, 1942, Vol. 13, abstr. p. 8.

The apples of thirty-three varieties were tested for their vitamin C content. It was found that some of the most commonly grown varieties, Ontario, Kaiser Wilhelm, Goldparmäne, Schöner aus Boskoop and Baumann's Reinette, contain satisfactory quantities, i.e. from 10 to 20 mg./100 g. fresh weight. It is noted, however, that high vitamin C does not always go hand in hand with high dessert value.

785. DAHL, C. G. 634.22: 581.47

Plommonstenarnas betydelse för bestämning av plommonsorter. (Significance of the stone in the determination of plum varieties.)

Sverig. pomol. Fören. Arsskr. 1940, 41: 96-102.

Determination of plum varieties is frequently difficult owing to the fact that the characters mentioned in pomological works lack conciseness. Characters such as size, colour, taste, consistency of flesh, etc., are largely dependent on development of the fruit. Recently careful studies have been made of stones of stone fruit trees and it has been found that these frequently show clearly marked characters. F. Kobel Wädenswil, Switzerland, has published "Die Kirschensorten der deutschen Schweiz" on this subject. More recently K. Röder has studied the morphology of plum stones and has published an article entitled "Sortenkundliche Untersuchungen an *Prunus domestica*. [Not traced at present.—ED.]

Many pomologists, among them Bredsted, call the side of the fruit which bears the groove, the dorsal side, and the opposite one the ventral side. This differs from the opposite method of description used by botanists, which is to be preferred and is used in this article.

Röder has carried out comprehensive measurements of stones, and attaches less importance to absolute measurements than to the proportions between length, breadth and thickness. The contour of the stone is frequently highly characteristic for each plum variety.

As Röder in other parts of his publication has indicated the characters in the flowers, the fruit, the shoots and so on

which he considers to be the most important for recognition of a plum variety, so he has also indicated these characters in the stones and has mentioned them in order of importance. This sequence for stone-characters is:—1. Index of length, thickness and breadth. 2. Absolute measurement of length, thickness and breadth. 3. Form of stone seen from broadside. 4. Arching of the sides (thus form of the stone seen from ventral side). 5. Number, depth and location of grooves, development in ridges and occurrence of centre ridge. 6. Character of surface.

An example is given in the article of the method used to distinguish *Ontario* from *Reine Claude d'Oullins* by means of the characters of their respective stones.

786. SCHANDERL, H. 634.23

Verschiedene Typen der spanischen Glaskirsche. (Different types of the Transparente d'Espagne (*Prunus cerasus*) cherry.)

Dtsch. Obstb., 1941, Hft. 8, p. 148 from abstract *Forschungsdienst*, 1942, Vol. 13, abstr. p. 9.

The author describes two types of Transparente d'Espagne* cherry, a self-sterile and a self-fertile type, and notes their differences. He stresses the desirability of transforming the self-sterile type into the self-fertile by topworking.

787. OVERHOLSER, E. L., KENWORTHY, A. L., AND BULLOCK, R. M. 634.25

Peach growing in Washington.

Pop. Bull. Wash. agric. Exp. Stat. 162, 1941, pp. 32.

An account of peach growing under irrigation in Washington. Among cultivation recommendations of general interest are the following:—For planting, one-year-old nursery stock, 4-6 feet high, with a diameter of $\frac{1}{2}$ inch, propagated on peach rootstocks, should be used. Peach are more susceptible than apple trees to toxic orchard soils resulting from arsenical spray accumulations. A good cover crop of rye or lucerne is recommended. A good system of training is similar to the modified central leader system used for apples. Fruit thinning results in smaller crops of better quality fruit. Optimum time of picking, precooling and cool storage are considered. In selecting varieties for canning such properties as hardiness, time of blossoming, yield, regularity of cropping and ripening characteristics as well as attainment of superior quality and the extension of the canning season over as long a period as possible should be recognized. In selecting for locker freezing, in addition to the above the rate of oxidation of the flesh should be considered. Diseases and pests and their control are briefly noted.

788. EUSTACE, H. J. 634.1/2

Fruit regions of Washington and Oregon.

Proc. N. York St. hort. Soc. 87th annu. Meet. 1942, 1942, pp. 100-7.

The production of the fruit districts of Wenatchee-Okanogan and of Yakima, Washington, and of Hood River and Medford, Oregon, is discussed. Figures are given of dried fruit production in California, Oregon and Washington and of U.S. imports of canned fruits and of bananas.

789. SNELL, K. 634.451

"Kaki"; eine neue Obstart in Italien. (The kaki in Italy.)

Angew. Bot., 1941, 23: 124-5.

Diospyros kaki was introduced into Italy after the world war of 1914-18 from Japan. It was first used as an ornamental plant and only later for its fruit. It requires little care and is singularly free from diseases and pests. It ripens late, Oct.-Nov., just at a time when the summer fruits are over. Ripening is hastened, and the sugar content increased by an ordinary frost, if the fruit is left on the tree. In spite of the relatively thin skin, the fruit keeps well. Like the tomato, it will ripen off the tree if picked before it is fully ripe. The

* Synonym for Spanish Glaskirsche given in Hedrick's Cherries of New York.—Ed.

fruit has a very high sugar content (60% of the dry matter is invert sugar), a low tannin content and is rich in vitamins. Damaged fruits can be used for the production of alcohol or as a cattle feed.

790. LEVINE, A. S. 634.14-1.56

A note on the Japanese quince.

Fruit Prod. J., 1942, 21: 177, bibl. 2.

The fruit of *Cydonia lagenaria* (*Chaenomeles*), the Japanese quince, is an unusually good source of malic acid. Jelly prepared from the aromatic fruits has itself little aroma, this being lost in heat treatment. Yet its addition to such products as apple or quince jelly and other low acid preserves at the rate of about 20% of the fruit will improve flavour. The concentrated juice can be used as a direct source of acid and pectin.

791. MÄDE, A. 631.434

**Über den Temperaturverlauf in Beständen.
(Temperature conditions in plantations.)**

Gartenbauwiss., 1940, 15: 312-33.

RUBZOV, G. A. 634.13

Polyorphismus and centers of formation of *Pyrus* species in the U.S.S.R.

C.R. Acad. Sci. U.S.S.R., 1939, 24: 81-4.

Propagation.

792. SHOEMAKER, J. S., AND HARGRAVE, P. D. 634.1/7: 631.54 + 631.541.5 + 631.541.11

Budding and grafting.

Joint Ser. Publ. Alberta Province and Univ., 2, 1942, pp. 37.

A well illustrated handbook to the more useful forms of budding and grafting. The opening pages deal with the selection for fruit tree rootstocks most suitable for Alberta conditions and their propagation.

793. APRESOV. 634.1/2-1.541

A new method of grafting fruit trees. [Russian.]
Sady i Ogorodny, 1941, No. 3, p. 39.

The method consists of bark grafting at ground level and, after waxing, earthing up to the level of the top bud of the scion, with the object of retaining moisture round the scion. It can be carried out in spring or summer. The wood of the previous year should be used both in spring and in summer, the side shoots of that year being first shortened back to 25 cm. from the point of origin.

794. NILSSON, F. 547.944.6: 634.13

Tetraploid hos päronplantor framkallad med hjälp av colchicin. (Tetraploidy in pears induced by colchicine treatment.) [English summary 9 lines.]

Sverig. pomol. Fören. Arsskr., 1940, 41: 103-7.

Seeds of two pear varieties, Williams and Herrepäron, were germinated in colchicine solutions, strength varying from 0.25 to 1.00%. Most of the seedlings were treated afterwards with 2% colchicine agar. Only $\frac{1}{3}$ of the seedlings survived, two of which seem to be pure tetraploids and two others chimaeras showing both tetraploid and diploid tissues. The tetraploids are slow growing and have rounder and thicker leaves and larger stomata. Following treatment with colchicine agar some seedlings show a tetraploid type of leaf, although the roots are diploid. [Author's summary.]

Rootstocks.

795. SHAW, J. K. 634.11-1.541.11

Something new in the stock market. Appraisal of various Malling stocks.

Amer. Fruit Gr., 1942, February, pp. 15, 20, March, pp. 16, 18, April, p. 19.

The characteristics of the Malling apple stocks IX, VIII, II, IV, V, VII, III, VI, XVI, XII, XIII are noted with special

reference to their behaviour in America. Some of the dwarfing stocks from early importations, namely II, III and V, have become mixed in commercial nurseries and are so being propagated. No. VIII has not been seen in commercial nurseries for some years.

796. SWARBRICK, T. 634.11-1.541.11: 663.3

A trial of cider apple varieties grown as bush trees upon crab and vegetatively raised rootstocks. Progress report 1935-1941.

A.R. Long Ashton agric. hort. Res. Stat. for 1941, 1942, pp. 11-8.

The first six years of a trial of different cider varieties of apple worked on French crab seedling and on Malling I rootstocks at 8 centres in different parts of the country show that all varieties have proved satisfactory, only one, Broad Leaf Norman, failing at one centre. Varietal characters, both as regards growth and precocity, are evident. In the fifth year from planting crops of 1 ton per acre were harvested from certain varieties. Rootstock has shown little effect on growth as yet but it is noticeable that the trees on Malling I stocks have come into bearing earlier than the others. Site, soil and management have affected growth.

797. ENIKEEV, KH. K. 634.23-1.541.11

An example of the influence of the stock on the formation of characters in inter-species cherry hybrids. [Russian.]

Vernalisation, 1941, No. 2 (35), pp. 103-4.

Cerasus besseyi Bail. was crossed with *C. tomentosa* Thunb. in 1936 and 38 hybrid seedlings were grown in 1937. Twigs from the one-year-old seedlings were grafted on to both parental species. The grafts on *C. besseyi* acquired much more resemblance to that species in form, colour and flavour of fruits, which contained 1½ times more tannin than the fruits from the same seedling ungrafted. Grafting on to *C. tomentosa* reduced the tannin content. Some seedlings on the other hand showed no effects from grafting.

798. TRUSSEVICH, G. V. 634.1/2-1.541.11-2.111

The influence of the stock on frost resistance in fruit tree scions. [Russian.]

Proc. Lenin. Acad. agric. Sci. Moscow, 1941, No. 10, pp. 21-5.

Observations were made at the Krasnodar Fruit Experimental Station in 1939 and 1940. Two varieties of pear, one each of plum and peach, and three of apricot as well as sweet and sour cherries were grafted on appropriate rootstocks, among which were pear, quince, plum, damson (*Prunus insititia*), sloe, myrobalan, apricot, peach and both sweet and sour cherry. In all, 86 combinations of stock and scion were tried and the effect of frost on the bark, sap wood, heart wood and buds noted. In the case of the apricot scions, apricot rootstocks were most successful in imparting frost resistance to the scions, this being most noticeable in the bark and buds. Neither apricot nor any of the other rootstocks had any effect on frost resistance in the other tree fruits, though their effects on the physiological characters varied.

799. BOZZINI, G., AND GRIMALDI, A. 634.25-1.541.11

Sui portainnesti del pesco e di altre drupacee. (Rootstocks for peaches and other stone fruits.)

Ital. agric., 1942, 79: 159-2.

The authors note that although both Manaresi at Bologna and De Angeli at Milan have done some work on peach rootstocks little fundamental research has hitherto been bestowed on the subject in Italy. Answers to a questionnaire sent to the chief Italian nurserymen showed that the rootstocks generally used are peaches derived from stones from hotel dustbins and the like or often enough from stones fallen from trees at the edges of orchards and allowed to germinate. Uniformity of growth and production in Italian peach trees is, therefore, found to be entirely lacking. The authors succeeded, partly with the help of growth

substances, in raising stocks from cuttings and layers, but they consider that the process cannot be recommended for common nursery practice. They therefore decided to collect peach stones of known origin both from Italy and elsewhere, grow them and select promising plants. So far they have planted and raised plants from 1,552 stones gathered from Italy, China, India and Persia and have selected from them 149 plants, of which 21 are now in full production. Further elimination for defects from the 149 will in course of time reduce the numbers to a dozen or so. Quite a number of the 149, especially among the wild Chinese and Indian varieties, show excellent growth of both top and root. It is hoped that eventually it will be possible to produce trees, the seed of which, either by crossing or self-fertilization, will produce plants of at least a certain degree of uniformity. They will then have to be tested under different environmental conditions. The authors have also started work on rootstocks for plums and cherries. So far they have isolated 7 types of *Prunus spinosa* from 917 plants, 13 of *P. myrobalana* from 329 plants, 23 of *P. mahaleb* from 474 plants and 10 of *P. avium sylvestris* from a small number of trees growing wild. Much greater uniformity was found in wild mahaleb and cherry than in the other two.

800. CANDIOLI, P. 634.23-1.541.11
Contributo alla conoscenza delle cause della mortalità del ciliegio. (The reason for early death in cherries.)

Ital. agric., 1942, 79: 207-14.

A discussion of the causes of early death in cherries in the Verona district of Northern Italy and in particular of the defects of some of the *Prunus mahaleb* rootstocks used. The mahalebs known in Italy are according to Fiori and Parietti (*Nuova flora analitica d'Italia*, Vol. 1, 1924) as follows:—*P.m.* var. *typica*, i.e. the light-barked type generally used as a rootstock near Verona, *P.m.* var. *cupaniiana* distinguished by its dark coloured bark and lack of vigour, and a further type, *P.m.* var. *transilvanica*, which is also sometimes found in the district. Illustrations show how the scion tends greatly to outgrow the stock in circumference, with subsequent breakdown of the tree when either of the last two is used as rootstock. It is, however, noted that all three types are inter-fertile and that there is, therefore, no certainty that a so-called *typica* type raised from seed will be suitable as a rootstock. The author considers that only the use of vegetatively raised stocks can solve the problem.

Pollination.

801. VAN DOREN, A. 634.11: 581.162.3
Commercial hand-pollination in New York and Washington States.
Proc. N. York St. hort. Soc. 87th annu. Meet. 1942, 1942, pp. 218-28.

The author gives the credit of evolving the technique of practical hand-pollination in the orchard to Heinicke and MacDaniels. Even in orchards where, in a normal season, ample cross-pollination is afforded by the introduction of top-grafted pollinating varieties the insects available as pollen vectors will not function adequately at low temperatures and under these circumstances hand-pollination on a commercial scale may be desirable. The technique of collecting and curing the pollen and of hand-pollination itself is described in detail and lists are given of suitable pollinators for McIntosh, Northern Spy, Delicious and Cortland.

802. BUTLER, C. G. 638.12: 632.95
Honeybee and orchardist. Spray danger and how to avoid it.

Fruitgrower, 1942, 93: 263-4.

Under orchard conditions arsenic in the form of lead or calcium arsenate is the main source of bee poisoning in the

spray mixtures in common use. The poison is taken in when the bee gathers water from the foliage or trunk, just over 0.00005 milligrams being lethal. Such poisoning is difficult to detect as the bees seldom reach the hive. More serious results arise from the bees collecting pollen contaminated with arsenical sprays since this causes the death of both adult bees and brood. The poison is often collected not from the apple blossom but from the weeds in flower beneath the trees. Precautions are suggested. Thus open blossom should never be sprayed, weeds in flower should be cut and removed, and spray drift on the hawthorn blossoms in neighbouring hedges should be avoided. The incorporation of 1% or stronger lime-sulphur in pre- and post-blossom sprays is believed to have a repellent effect on bees. Provision of slightly sugared water near the hives might be tried. Hives should not be placed in the orchard until the early varieties are in flower and should be removed before sprays are applied.

803. MORETTINI, A. 634.63: 581.162.3
L'agente vettore del polline dell'olivo. (The vector of olive pollen.)
N. G. Bot. Ital., 1940, 47: 264-70.

Growth and nutrition.

804. SOUTHWICK, L. 634.11-1.55
The McIntosh drop.
Bull. Mass. agric. Exp. Stat. 372, 1940, pp. 19, bibl. 29.

Observations on the premature fall of McIntosh apples. It is noted that the abscission process is characterized by a chemical dissolution of cell walls and separation of tissues rather than by cell division as in abscission of blossom and young fruits. The significance of the nitrogen relationship is marked. This dropping was more severe under cultural conditions which make nitrates plentifully available, particularly late in the season. Heavy mulching, organic or mineral nitrogen applications, late cultivation and limb injections of nitrogen tended to increase its incidence. On the other hand, a low level of fertility, sod culture, limited cultivation, low tree vigour, and late summer ringing tended to delay the start of the drop. Often dropping was found to increase with increasing yields, in which connexion it may be noted that larger crops in well manured orchards often more than compensated for the heavier drop. On clonal stocks severity of drop appeared to be related to stock but not necessarily according to the vigour of the stock. Thus the percentage drop on E.M. XVI was 47.2 ± 2.68 , on E.M. IV 40.0 and on E.M. XII only 23.0 ± 2.09 . There was evidence of the significance of high summer means, short periods of high temperatures late in the season, and wet seasons in increasing drop. The possibility of using hormone sprays is noted.

805. HOFFMAN, M. B. 577.15.04: 634.11-1.55
Blossom sprays to take apples off and harvest sprays to hold them on.
Proc. N. York St. hort. Soc. 87th annu. Meet. 1942, 1942, pp. 172-9.

An account is given of the application of Elgetol to prevent excessive set of fruit in Wealthy apple trees. With trees in a moderate to good state of vigour and weather conditions such that not more than 2 days elapse between the opening of the centre flowers and full bloom it seems that a 0.2% Elgetol spray applied at full bloom should destroy all flowers except the earliest ones to be pollinated and result in fairly satisfactory thinning of fruit. If cool weather lengthens the period over which the flowers open to more than 3 days, 2 applications may be advisable, the first 2 days after the first flowers open and the second at full bloom. Tests are also recorded of the effect of 0.001% naphthalene acid spray on retention of apples on McIntosh and Baldwin trees. It was noticeable that the hormone

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spray was much more effective in checking fruit fall in warm than in cold weather. When such late varieties as Baldwin, and Spy are grown in northern latitudes, cool weather will, in many seasons, prevent excessive premature drop. Hence the desirability of using the spray on late varieties in northern latitudes will depend considerably on seasonal conditions.

806. SOUTHWICK, L., AND SHAW, J. K.

634.11-1.55: 577.15.04

Spraying to control preharvest drop of apples.
Bull. Mass. agric. Exp. Stat. 381, 1941, pp. 16, bibl. 6.

The authors, who worked mainly with McIntosh apple trees, give an account of the response of the trees to attempts to delay fruit fall by the application of hormone sprays. The effective period of a spray varies greatly with variety, being 10-12 days with McIntosh and Wealthy. There is usually a delay of about 2 days before the effect of the spray becomes apparent. The application should be made as soon as well sized and uninjured, uniform apples begin to drop in any quantity. The best results were achieved at the highest concentration of chemicals used, namely, 10 p.p.m. of water. Each apple stem must be well wetted, which means very thorough coverage varying with size of tree or crop from 10 to 40 gals. per tree or 1-2 gals. per bushel. The inclusion of a small amount of summer oil tended to increase effectiveness and 1 pint of this in 100 gals. spray did not seem to affect the fruit at all. Five commercial proprietary products and dissolved naphthalene acetic acid powder were used. There was little to choose between them but the commercial preparations are rather more quickly handled.

807. KILLIAN, J. O. 634.11-1.55: 577.15.04

My experience with hormone sprays.

Proc. Wash. St. hort. Ass. 37th annu. Meet. 1941, 1942, pp. 89-90.

Successful results were achieved by the use of hormone spray [unspecified] for the later retention on the tree of both Delicious and Winesap apples.

808. CLARK, C. 634.13-1.55: 577.15.04

Results from using hormone sprays on Bartlett pears.

Proc. Wash. St. hort. Ass. 37th annu. Meet. 1941, 1942, pp. 87-8.

A note of the successful application of "Fruitin", a hormone spray, to Bartlett pears. It not only kept the pears on the tree longer but also made the picking much easier when it was done owing to the fact that adjacent pears were not so liable to fall as the result of jolting when picking the others.

809. OVERHOLSER, E. L., OVERLEY, F. L., AND

ALLMENDIGER, D. F. 634.11-1.55: 577.15.04

Further studies with certain chemicals to prevent fruit drop and increase red color.

Proc. Wash. St. hort. Ass. 37th annu. Meet. 1941, 1942, pp. 79-86, bibl. 10.

The authors observed the results of using a proprietary hormone spray for the retention of apples on the tree. Summarizing they note that the time to apply such sprays are just as the fruit begins to show evidence of normal dropping. Response of different varieties differs slightly. Thus the period of effectiveness begins 2-3 days after application and continues for 9-10 days with McIntosh and for 2-3 weeks or more with other varieties tested. If relatively low temperatures prevail during spraying and after, 6-7 days may pass before the spray becomes effective and its effectiveness may then be somewhat longer. The use of spreaders or oil appears slightly to increase the spray's effectiveness. The use of growth substances at a concentration of about 10 p.p.m. is advised. With the varieties studied spraying does not appear to have any direct effect on fruit maturity or storage response. Although the use of α -naphthal-

isothiocyanate spray has increased the fruit colour of apples slightly, its commercial use is at present not recommended.

810. BERRY, W. E., AND SWARBRICK, T.

577.15.04: 634.11-1.542

The influence of alpha-naphthalene acetic acid sprays on the pre-harvest drop of apples under different systems of pruning.

A.R. Long Ashton agric. hort. Res. Stat. for 1941, 1942, pp. 19-22, bibl. 3.

The late-keeping cooking apple, Edward VII, is often picked a month earlier than would otherwise be necessary to avoid the risk of September gales. Trees of this variety growing under five different pruning systems were sprayed with α -naphthalene acetic acid at .001% and .005% concentration to reduce pre-harvest drop. Spraying with the .001% solution reduced fruit drop considerably when the trees were subject to a 50 m.p.h. gale. Drop from pruned was less than that from unpruned trees and summer pruning reduced the drop compared with that of trees winter-pruned only.

811. VAN MIDDLESWORTH, L.

577.15.04

New practical use for plant hormone.

Fruit Prod. J., 1942, 21: 268, 280, bibl. 8.

The spraying of fruit with 1-naphthaleneacetic acid at the rate of 5 parts per million to prevent pre-harvest fruit drop is discussed. The hormone acts by inhibiting the formation of abscission layers in the fruit stem. The spray takes 2 or 3 days to take effect, reaches its maximum effect on the 7th or 8th day and loses activity in 10 to 15 days. Thus accurate time of application is of first importance. After the hormone has become inactive drop will be greatly accelerated unless the fruit is harvested or resprayed. Other important uses of this hormone are forecast.

Soils, manuring and cultural practice.

812. COLLISON, R. C., AND CARLETON, E. A.

634.1/2-1.874

Orchard covers and their relation to soil conservation.

Bull. N. York St. agric. Exp. Stat. 701, 1942, pp. 33.

The changes in soil nitrogen and organic content in 7 years on 32 open plots, which had received various cover cropping and cultivation treatments possible for orchard conditions, are reported. Data on water runoff and soil-erosion losses from 6 plots are also given. Results are tabulated according to type and duration of crop. Clean cultivation caused depletion of nitrogen and organic matter and serious soil and water losses on an 8% slope. All cover crops reduced such losses. Non-legumes ploughed in annually, millet, oats, rye, rape and buckwheat, failed to maintain total nitrogen, but increased organic matter. Legumes, seeded annually—sweet clover, red clover, alsike, soybeans and vetch—maintained nitrogen and increased organic matter. Mixed legumes and non-legumes, such as oats and sweet clover were equally effective. Early June seeding was superior to autumn seeding, especially when the crop stood during winter and was turned in in spring. Soybeans were outstanding in erosion control and also increased water absorption by holding a deep snow cover. Three-year leys and permanent sods of Kentucky Bluegrass (*Poa pratensis*) barely maintained nitrogen, but increased organic matter. Alfalfa markedly increased nitrogen as well as organic matter. The grass gave perfect erosion control, but allowed rather large water losses. Mulches of carried-on material, and "stubble mulch" sowing, are briefly discussed, but were not included in these trials. Among practical recommendations given, clean cultivation is "not to be recommended for long, and better not at all"; if used, however, leaving autumn weeds is recommended, but "better than autumn weeds is a regularly seeded cover

crop". Legumes and legume mixtures are especially satisfactory. Permanent sods should include legumes—especially the shallower rooted ones—and may need partial cultivation to avoid too serious competition with the trees. Lucerne may compete too severely. All erodible soils should be kept covered for as long a period as possible. Cultural notes on these cover crops were given in a previous paper [see *H.A.*, 10: 1325].

W.S.R.

813. OVERLEY, F. L., MORRIS, O. M., AND OVERHOLSER, E. L. 634.1/2-1.874

Orchard cover crop studies.

Proc. Wash. St. hort. Ass. 36th annu. Meet. 1940, 1941, pp. 120-5.

The growth of lucerne and sweet clover as cover crops for orchards in the Wenatchee and Yakima districts has gradually diminished in recent years probably as the result of deep annual discing, competition of weeds and grass, close planting of trees and the accumulation of spray residues in the soil. While attempts have been made to facilitate the growth of lucerne by control of weeds, the addition of particular chemicals, wood ashes, peat, and farmyard manure to the soil, experiments have also indicated that the growing and discing in of a rye cover crop improves the general orchard condition, the physical condition of the soil and its water content and tree vigour and production. It appears also to facilitate pest control.

814. PARTRIDGE, N. L., AND HARRISON, C. M. 634.1/2-1.874

Permanent grass cover for the orchard.

Quart. Bull. Mich. agric. Exp. Stat., 1942, 24: 211-7.

The improved performance of orchard trees in Michigan (apple, pear, plum and cherry) under sod mulch treatment compared with the more usual clean cultivation-cover crop system is claimed. In addition labour costs are halved, and erosion is prevented. This paper gives instructions for the seeding and maintenance of a grass orchard. Types of grass for various sites are discussed. Points to notice are that the soil should be well firmed before sowing. On poor land or land subject to erosion the seed should be covered with a very thin mulch, through which the ground should be visible. The grass is cut when the heads are formed, and if thin may be left on the land when mown, if vigorous the cuttings are raked under the trees to serve as mulch. This grass should receive 150-200 lb. per acre of ammonium sulphate until well established and be limed, if the pH is 5.4 or less. For 2-3 years after seeding the orchard mature trees will require additional nitrogen. Two pounds of sulphate of ammonia per tree is suggested. Younger trees will require proportionately less. Mulching the trees under the spread of branches is advised, the mulch being brought in from outside if that provided by the grass cuttings is insufficient. If legume hay is used for this the regular application of nitrogen should be reduced.

815. BOYNTON, D. 631.4: 634.1/7

Soils in relation to fruitgrowing in New York.

Part XV. Seasonal and soil influences on oxygen and carbon-dioxide levels of New York orchard soils.

Bull. Cornell agric. Exp. Stat. 763, 1941, pp. 43, bibl. 27.

The results of studies reported in this bulletin contribute to the knowledge of the aeration of orchard soils mainly as they throw light on the effect of soil type on the fluctuations of oxygen and carbon-dioxide percentages in the soil air, under north-eastern temperature conditions, in years when the annual rainfall is less than 35 inches and when periods of excessive rainfall are short and few. They suggest that an excess of only a few inches of precipitation in May and June may have a far greater depressing effect on the air supply of the subsoil than will an excess twice as great occurring in

September. They indicate the relation of seasonal changes in aeration of the soils considered to the seasonal development of apple trees situated on those soils. As the investigation is carried forward under seasonal conditions not yet encountered, and as the results are correlated with those of controlled studies on fruit-tree response to different soil-air compositions, it should be possible to evaluate marginal fruit soils with a closer approach to accuracy. [Author's summary.]

An appendix contains methods of sampling and analysis used and a description of the soils studied.

816. BOYNTON, D. 631.8: 634.1/2

Progress toward a more scientific basis for orchard fertilization.

Proc. N. York St. hort. Soc. 87th annu. Meet. 1942, 1942, pp. 192-8.

Evidence is given showing that leaf analysis for N and K content can give a good idea of the necessity or otherwise of nitrogenous or potassic fertilizers for trees from which sample leaves were taken. It will be noted, however, that the Italian prune, for instance, will sometimes show potassium deficiency symptoms under soil conditions in which apples grow normally. Thus, whereas K deficiency leaf scorch of apple does not seem to show up till the K content of the leaf goes well below 1% of dry weight, there may be considerable leaf scorching and rolling on prune trees whose unscorched leaves are above 1.0% in K content, and whereas in the apple the normal minimum in the leaf for healthy growth of the tree is about 1.0%, in the prune the normal minimum range seems to be between 1.5 and 2.00%. There are indications that peach and sour cherry are intermediate in their K requirements and that their minimum leaf range may also be intermediate. As regards K, leaf analysis makes possible comparisons of the effectiveness of different K carriers and methods of application, it can furnish evidence to substantiate or refute the importance of fixation of K in certain soils, where that might be important, and it can indicate that lack of response by fruit trees is or is not due to failure of the trees to absorb K.

817. SCHULZ, F. 631.874: 634.1/7

Ueber Torfkompostdüngungsversuche im Obstbau. (Trials of compost manuring in the orchard.)
Landw. Jb., 1941, 91: 441-8, bibl. 2.

Comparative trials by the Institut für Obstbau, Berlin, are here recorded on the manuring of pears and strawberries. The treatments consisted of the application of nil, farmyard manure, compost, and artificials. The compost was moss turf from the high moors of north west Germany treated with nutrient salts (actual composition not given). The compost proved its worth in these trials. It was noticeable that the application of a double dose of compost appreciably increased cold resistance in the strawberry beds, var. Eva Macherlauch, but did not have any such effect on the Alexander Lucas pears grown as spindle bushes on quince A. The strawberries treated with compost showed better vegetative growth than those receiving artificials only. Organic manure, especially the compost, resulted in higher soil moisture content than artificials. There was little difference in cropping of strawberries, though it may be noted that the highest crop came from the compost-treated plots in 1939.

818. HOPKINS J. M.

Speedy method of making humus.

N.Z. J. Agric., 1942, 64: 125.

A system of composting is described whereby complete breakdown of material is achieved in a few weeks. The method differs from ordinary composting only in the introduction of air vents into the base of the heap. The humus-making plant described is an above-ground receptacle of cement and boulders, 8 ft. x 3 ft. and 2 ft. 9 in. deep, divided midway by a partition. At the bottom of each container a 12 inch square is dug out and covered with

heavy wire netting. Leading to the outside from each 12 in. square is a 9 in. pipe. The indraught of air through these pipes appears to stimulate the heating process. Larger pipes slow down combustion. Material placed in one container is turned into the other in 3 weeks and is ready for use a month or 6 weeks later. Wood shavings and sawdust, if used in small quantities, quickly disappear.

819. FRAPS, G. S., OGIER, T. L., AND ASBURY, S. E. 631.82/85

Commercial fertilizers in 1940-41.

Bull. Tex. agric. Exp. Stat. 607, 1941, pp. 47.

The annual Fertilizer Control Bulletin affords statistics of the sale of fertilizers in Texas and information as to the contents of the fertilizers sold. It discusses the inclusion of vitamin B₁ in fertilizer mixtures and the use of fertilizers for water culture and in general.

820. SANNIKOV, V. S. 634.1/2-1.862

The use of liquid manure for fruit trees trained horizontally. [Russian.]

Sady i Ogorody, 1941, No. 3, p. 41.

Regular manuring is necessary for fruit trees trained horizontally, since they naturally bear later and are weaker and smaller than those grown in the normal position. The application of liquid manure in diluted form to apple trees growing in a soil of the Solonetz black soil type proved highly effective in promoting growth of young trees and much superior to well rotted dung. Liquid poultry manure also proved most efficacious.

821. REHLING, C. J., AND TRUOG, E. 631.811.9

"Milorganite" as a source of minor nutrient elements for plants.

J. Amer. Soc. Agron., 1942, 32: 894-906, bibl. 39.

"Milorganite" is dried activated sludge produced by the Milwaukee Sewage Disposal Plant. Investigations are described, the results of which show clearly that when used as a fertilizer or a constituent of mixed fertilizer the material may serve as a source of minor nutrient elements for plant growth.

822. MAGNICKI, K. P. 634.1/7-1.8

The application of fertilizers to orchard soils by means of injection. [Russian.]

Proc. Lenin Acad. agric. Sci. Moscow, 1941, No. 11, pp. 19-23.

An account of trials with the fertilizer lance. The fertilizer solution was introduced at 40 cm. below ground level at a pressure of 5 atmospheres using ordinary spraying machinery. The effect on the N, P and K content of the soil of thus introducing fertilizer was determined by quantitative analysis of the soil in the vicinity of the injection.

823. SHAW, J. K. 634.1/7-1.542

Pruning young fruit trees.

Leaf. Mass. St. Coll. 109 (revised), 1939, pp. 8.

Directions for pruning fruit trees of various kinds in their early stages with a view to forming a tree well-balanced mechanically and producing the maximum quantity and quality of fruit and to securing the maximum growth in proper relation to these purposes.

824. STÖY, O. 634.11-1.542.24

Ett barkringning försök. (A ringing experiment.)
Sverig. pomol. Fören. Arsskr., 1940, 41: 113-20.

Two ringing experiments on apple trees by the author in two Scania nurseries lead him to the conclusion that under conditions obtaining there complete ringing cannot be recommended. He finds, however, indications that half-

ringing or incomplete ringing of branches may be valuable in gardens when an annual yield from a few trees is wanted.

825. HENDRICKSON, A. H., AND VEIHMEYER, F. J. 631.67: 634.11+634.13

Irrigation experiments with pears and apples.

Bull. Calif. agric. Exp. Stat. 667, 1942, pp. 43.

Experiments on the irrigation of pears and apples under interior valley and coastal conditions on 6 soil types were carried out. Results substantiate those previously obtained with peaches, prunes, grapes and walnuts. Pears grow normally under a wide range of soil and climatic conditions, when trees are kept supplied with readily available soil moisture, but deleterious responses, as decreased size and delayed maturity, result when the soil moisture is reduced to about the permanent wilting percentage. Similar results were obtained with apples. Mature pear orchards grown in districts having high summer temperature exhaust the readily available soil moisture about July 1. Under these conditions, one or two irrigations before harvest generally suffice. In the central coast regions, in years of sufficient rainfall to wet 6 feet of soil, pear and apple trees do not exhaust the moisture until late in the season and irrigation seems unnecessary. A.H.H.

826. MORRIS, O. M. 634.11-1.874: 581.144.2

Apple tree roots and cover crops.

Proc. Wash. St. hort. Ass. 37th annu. Meet. 1941, 1942, pp. 43-6.

ZIPPELIUS, H. 634.1/7-1.513

Die Bodenlockerung im Obstbau durch das Sprengverfahren. (The use of explosives for opening up orchard soils.)

Grundlagen u. Fortschritte im Garten- u. Weinbau 63, Ulmer, Stuttgart 1941, pp. 53, RM. 1.60, reviewed in *Pflanzenbau*, 1941, 18: 159.

Marketing.

827. SOUTH AFRICA, CHIEF FRUIT INSPECTOR'S OFFICE. 634.13: 382.6

The export of fresh pears from the Union of South Africa during the ten-year period 1930 to 1939.

Bull. S. Afr. Dep. Agric. 58 (Hort. Ser. 7), 1941, pp. 47, 3d.

Quantitative and qualitative facts are provided in a form that should enable such points as seasonal fluctuations and the relative importance of varieties and of localities to be readily determined.

828. BUCHANAN, M. T., AND DUMMEIER, E. F. 634.11: 658.8

The marketing of Washington apples in Los Angeles, California. Part 1. Transportation and wholesale distribution.

Bull. Wash. agric. Exp. Stat. 406, 1941, pp. 51, bibl. 19.

The respective advantages and disadvantages of road and rail transport of Washington apples to Los Angeles are discussed, as also methods of distribution after sale in the market. Purely business reasons are suggested why more apples are received from the Yakima than the Wenatchee district.

829. WOODIN, M. D. 634.1/7: 338

Changes in the prices of apples and other fruits.

Bull. Cornell agric. Exp. Stat. 773, 1941, pp. 25.

SMALL FRUITS AND VINES.

830. BAILEY, J. S., FRANKLIN, H. J., AND KELLEY, J. L. 634.73

Blueberry culture in Massachusetts.

Bull. Mass. agric. Exp. Stat. 358 (revised), 1941, pp. 20, bibl. 10.

Although the swamp blueberry can tolerate low swampy positions, it grows much better on a well drained, slightly acid, fertile soil having a steady, adequate water supply. Hitherto uncultivated land is prepared by clearing and draining so that the water table will remain at least 14 inches below the surface. It is ploughed and harrowed and left fallow for a year. The best varieties for commercial planting in Massachusetts are Pioneer, Rubel and Wareham. Propagation is in a cold frame by means of cuttings in a mixture of equal parts of a sphagnum peat, and sand, well ground and of high acidity. The cuttings can be taken in winter and stored in moist sphagnum or 2-year-old sawdust till spring or they can be taken and used direct from the bushes in March. They should be from wood of the previous year's growth and should have no fruit buds. The developing cuttings are left in the cold frame over the winter and are then set out in the nursery to grow for a year or two before transplanting to their permanent quarters, where their spacing should not be closer than 5 feet in rows 8 feet apart or 10 feet apart if a tractor is to be used for cultivation. The plantations are kept shallow cultivated from early spring to mid-August. Fertilizers are good for bearing plants, those tending to keep the soil acid being best, a mixture of nitrate of soda, calcium nitrate, 20% superphosphate and sulphate of potash, analysing about 7-8-7, being recommended. Pruning is essential and varies with the character of growth in the different varieties. The fruit buds are on the terminal part of the shoots. They form in the axils of leaves during the summer, stay dormant in the winter, then bloom and produce fruit the next summer. Those varieties which produce many shoots from the base need more thinning out of this growth than those with few such shoots. Those which branch freely need more top thinning than those with few branches. Those with fruit buds on the terminal two-thirds or three-fourths need more cutting back than those with fruit buds on only the terminal third or fourth of the shoot. Pruning practice based on these facts is discussed. The control of the more important diseases and pests is outlined. Notes are given on picking and sending to market. Finally an account is given of the improvement of wild highbush berries by proper cultivation methods.

831. CLARK, J. H. 634.73

Recent developments in blueberry culture.

Rur. N. Yorker, 1942, 101: 275, 277.

Blueberries, especially on too heavy or too dry soils, respond well to continuous mulch. Many different materials have been used with success including sawdust alone, sawdust and shavings, pine needles, hay. There appears to be no good cover crop that will grow on blueberry land and produce enough dry matter to keep up the organic content of the soil. Although blueberries prefer a very acid soil the author notes that both in Michigan and New Jersey he has seen the blueberry plants continually fail to grow until an application of lime had been made. Propagation is liable to be upset by weather conditions. To avoid this the cuttings in Michigan are grown in glass-covered frames and in New Jersey in lath houses. Top-working to new varieties is sometimes practiced, but old plantations cannot satisfactorily be worked over on a large scale to better varieties by this means. The buds do not take easily and the cutting back of the stock induces the formation of an uncontrollable number of stock shoots which swamp the scion. The remainder of the article deals with pest control (deer and birds) co-operative marketing and new varieties, of which Atlantic, Pemberton and Burlington receive special mention.

832. LINEBERRY, R. A., AND COLLINS, E. R. 634.75-1.8

Fertilizing strawberries in North Carolina.

Bull. N.C. agric. Exp. Stat. 332, 1942, pp. 20, bibl. 21.

Results of experimental fertilizing and liming of strawberries in N. Carolina are summarized. The ratio and rate per acre are 5-7-5 or 4-8-4 at 1,500-2,000 lb. per acre applied half in September and October and half in December. Organic (insoluble) nitrogen should be 25 to 40% of the total nitrogen. Supplementary applications of nitrogen in the spring increased yield, delayed ripening and lowered keeping qualities. The more acid areas showed the larger percentage of dead plants. Applications of sulphur and physiologically acid fertilizers increased the number of dead plants. Lime-stone applications of 200-800 lb. per acre increased yields on these experimental fields.

833. VAN METER, R. A. 634.711

Raspberry growing in Massachusetts.

Leaf. Mass. St. Coll. Ext. Serv. 48, 1938, pp. 20.

FRENCH, A. P. 634.75

Strawberry growing in Massachusetts.

Leaf. Mass. St. Coll. Ext. Serv. 29 (revised), 1939, pp. 16.

WITHROW, W. A. 635.611

Muskmelons at Walberta Farm.

Rural New Yorker, 1942, 101: 69.

The cultivation of muskmelons in Eastern U.S.A.

SEARS, F. C. 634.8

Grape growing in Massachusetts.

Leaf. Mass. St. Coll. Ext. Serv. 64, 1938, pp. 16.

CLORE, W. J. 634.1/8+635.1/7

Small fruits and vegetable varieties for irrigated central Washington.

Proc. Wash. St. hort. Ass. 37th annu. Meet. 1941, 1942, pp. 69-78.

Includes grapes.

834. LYON, A. V., AND WALTERS, D. V. 634.873

Production of dried grapes in Murray Valley Irrigation Settlements. I. Viticulture.

Bull. Coun. sci. industr. Res. Aust. 143, 1941, pp. 48.

The work of the Commonwealth Research Station, Merbein, on the production of sultanas, Zante currants and the dried fruits of other vine varieties grown on their roots. The Merbein climate is sub-continental with an average rainfall of 10.46 in. For the months of December, January and February records show an average of over 10 hours bright sunshine a day, a mean temperature of over 70° F. and maximum temperatures showing an average of 87.4° F. The period May to August averages 4.6 frosts a month. In September the average is 2 frosts and in October 1 frost in one year out of three. The growth of the vines is discussed. Sultanas ripen in mid-February and may remain on the vine in good quality for about 3 weeks. The number and size of inflorescence primordia are important in determining the yield of the sultana. Other varieties bear fruit on nearly all buds. The vines have perennial roots up to 12 feet long spread fanwise through the soil down to about 20 in. deep with some smaller roots going deeper. Feeding roots function for one season only and are up to 1½ in. long. They form a horizon of feeding rootlets at the base of the cultivation zone and are always associated with an endophytic mycorrhiza. Yield of dried fruit depends on number of bunches, number of berries per bunch, size of berries and sugar content of berries. A relation has been established between the amounts of foliage and fruit when maintaining quality and the effects of winter and summer pruning in this connection are discussed. Although the vine is capable of a marked degree of compensation, it is possible to reach a

stage where increase in bearing units is not of benefit. Summer pruning is usually harmful but may be useful sometimes to increase bud fertility, protect from summer sun or rains and train young vines. Ringing is necessary to set fruit in the Zante. The technique is discussed. It does not permanently improve yield in sultanas. Generally speaking after frosts it is best to delay pruning until the following winter. Vineyard heating in the spring (fuel oil or coal briquettes) is now practised on a community basis. Summer rains invariably damage the ripening grapes and as yet no satisfactory method has been devised to prevent this. Methods of training young vines and of partial and complete reconstitution of old vines are described. Reconstitution is most satisfactory when the new trunk arises below ground level and produces new roots. Nitrogenous manuring is all important and the preservation of soil fertility should be aimed at by the use of green manure (tick beans).

835. EVTUSENKO, L. J. 634.8-1.51

The mechanism of viticulture.

Sady i Ogorody, 1941, No. 3, pp. 28-33.

A discussion of many new implements, some in the experimental stage, designed for use in viticulture and especially working the soil before and during vine cultivation. The VUM 60, which essentially consists of a frame on two wheels, can be adapted to a large number of uses such as cultivating between the rows, manure spreading, earthing up, etc. All the implements noted are only suitable for level ground.

836. TAVADZÉ, P. G. 634.8-1.541.11

Niveau des yeux sur le sarment de vigne, sujet ou greffon, comme facteur déterminant la proportion de reprises. (The level of the bud on vine budwood and stocks and its influence on union.)

C.R. Acad. Sci. U.R.S.S., 1939, 23: 380-3, bibl. 7.

The author's material consisted of *vinifera* scions of Rkaziteli grafted on the American rootstock, *Riparia* \times *Ruprestris* 420A, and the scion, containing buds situated at different levels on the selected wood, was inserted on pieces of rootstock material taken from apical, middle and basal positions on vine shoots at Telav, Georgia, U.S.S.R. 1,200 grafts were made in all. The results show that ease of union varies considerably according to the position on the stem from which the two component pieces are taken and their value varies with the distance of their buds from the base. The central and apical parts both of the American vine and especially of the European scion, being the youngest and so the most advanced as regards stage of growth, give the highest percentage of take. It was found that the fine lignified apical portions of the American vine form the best unions, despite the fact that in practice they are usually not used for the purpose.

837. WALTERS, D. V. 634.873.2-1.67
Manorial trials with irrigated sultana vines in the Murray Valley, Australia.

Emp. J. exp. Agric., 1942, 10: 77-88, bibl. 5.

Nitrogenous fertilizers, preferably sulphate of ammonia, were the only ones to give consistent increased sultana yields from 8-18%. Dried blood and winter green crops of *Vicia faba* (tick bean) were also satisfactory. Phosphates and potash had no effect on yield. The variation in levels of pruning gave a 7-12% increase in most years on all trials in favour of the greatest number of canes used (up to 10; some growers average 12 per vine). Throughout the trials even the most favourable treatments produced only small changes. The reasons are discussed and it is suggested that a minimum period of 7 years is necessary for the conduct of a manorial trial and that continued treatment for a much longer period would give valuable information.

838. CORBAZ, J., AND DESHUSSES, L. A. 631.544.3

Les marcs de raisins pour le chauffage des couches et comme engrais organique. (Grape marc as heating material for hot beds and as organic manure.)

Rev. hort. Suisse, 1942, 15: 55-9.

Compost prepared from marc—the residue of distilled grapes—is shown to be 3 times richer than a good stable manure. To form the compost the marc is built up in layers 15 cm. thick, between each of which is sprinkled cyanamide or some proprietary substitute (e.g. Composto, Lonzer, Adco, etc.) to the amount of 500 g. per sq. m., giving a light watering if the marc is dry. The width of the completed heaps should be 1.5 m., the height 1.2 m. and the length whatever is convenient. If the heap dries it should be moistened. After 2 months it is turned and in a further two months it is ready for use. The addition of 1 kg. of sulphate of potash and 10 kg. of bone meal per 100 kg. of cyanamide will greatly increase the value. The previous removal of pips from the marc for oil extraction, which is now compulsory in Switzerland, in no wise reduces its value. Marc can also be used as a heating medium for hot beds. Experiments by the Laboratoire de chemie agricole, Châtelaine, show that properly treated they provided as much heat as manure, retained a heat above 20° C. for 45 days, or more than twice as long as stable manure, and produced a higher yield and better quality in the vegetables grown on them. Unlike hot beds built of manure there is very little wastage of material as a result of heating, it is twice as rich in organic material as spent hot bed manure, carries more nitrogen and potash but less phosphoric acid. The manner of making up the bed is similar to that of composting and the inclusion of 1.5% of cyanamide is necessary. It is important that the final covering of earth should not be added till the internal temperature has reached 40-50° C. The bed is ready for use 3 days after the earth is laid on.

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839. COOK, C. 632.953: 634.1/9
Some aspects of tree surgery in Canada.

Ann. appl. Biol., 1942, 29: 205-8.

Notes are given of climbing trees by means of ropes—not spurs which tear the bark and allow the entry of diseases and insects—, of removal of unwanted wood, of the preparation and filling of cavities and of the use of tiles.

840. KOLESNIKOV, V. A. 634.11-2.19: 631.43

Premature leaf fall of apple trees in the Crimea. [Russian.]

Sady i Ogorody, 1941, No. 2, pp. 52-3.

Deterioration of apple trees in the Crimea resulted from premature leaf fall which took place 1-1½ months too soon. Investigations showed that the condition of the soil was

mainly responsible for this. The soil under conditions of excessive precipitation and lack of drainage was frequently waterlogged and lost its structure, thereby checking root growth and nutrition.

841. LUDBROOK, W. V., AND WALTERS, D. V. 634.8-2.19

The results of inoculating grape vines with a fungus isolated from "dying vines".

J. Coun. sci. industr. Res. Aust., 1942, 15: 81-2, bibl. 1.

The "dying vine" disease of the Murray Valley is thought to be primarily physiological.* The fungus used for inoculation, though more commonly found in affected wood than

* For symptoms see *H.A.*, 10: 1358.

any other organism, is only weakly, if at all, parasitic. The possibility of a pathogen is not excluded and time was insufficient to investigate possible environmental factors concerned. The investigations have been discontinued.

842. CLAUSEN, R. 632.111
La prévision des gels printaniers. (Forecasting
spring frosts.)

Rev. hort. Suisse, 1942, 15: 52-5.

For several years thermographs have registered temperatures during the months of April and May in various parts of the Rhone valley. From these records the author has evolved a simple method of forecasting the probable minimum night or early morning temperatures for each of a number of localities. The table to work from is obtained as follows. Three sets of temperature means for the locality concerned have been calculated from the falls of temperature shown on the thermographic bands nightly from 8 p.m. to the minimum for the night. (1) *Little mean* is the mean of all these falls of temperature when occurring under a clear, partly or wholly cloudy sky or during rain, high wind, etc. (2) *Great mean* is the mean of all falls of temperature occurring when the sky is clear or nearly so both night and morning, atmospheric humidity low, wind light, to which may be added the effect of cold winds, which allows a relatively large fall in nocturnal temperature. (3) *Extreme mean* is the sum of the great mean and twice its deviation. To obtain a forecast the observer notes the temperature by ordinary thermometer in his orchard at 8 p.m., say 14.40°C., subtracts therefrom the small mean for his locality, say 6.94°C. = 7.46°C. He also subtracts the great mean, say 9.84°C., 14.40°C. - 9.84°C. = 4.56°C., and the extreme mean, say 14.21°C., 14.40°C. - 14.21°C. = 0.19°C. If the sky is cloudy the minimum temperature for that night will be between 7.46°C. and 4.56°C. If, however, the sky is clear and visibility good, he can expect a sharp drop in temperature and the minimum will fall below 4.56°C. but not appreciably below 0.19°C., in other words there will be no frost that night, and the grower need not cover his vines. Other examples are given from the records, showing the successful prediction of frost. It is claimed not that the actual minimum temperature for the night will be predicted, but that used aright the method will forecast the worst that can occur on any given night.

843. LEONOV, I. V. 634.11-2.111
Michurin's apple varieties trained to grow hori-
zontally. [Russian.]

Sady i Ogorod, 1941, No. 1, pp. 45-6.

This article describes the growing of trees of some of Michurin's apple varieties in the Minusinsk region of Siberia where they were first planted in 1934. Having been budgrafted on Siberian Crab the resultant young trees, when one year old, were planted at an angle of 45° and at intervals of 6 x 6 metres, their crowns inclined towards the prevailing wind. When being trained, in order to prevent the stem from breaking, a cut was made near the ground, and as the shoots grew they were pegged down to 20 cm. from the surface by means of wooden pegs. The branches were grown on two or three levels but never more than 1 metre above the ground. All superfluous branches, including any which crossed, were cut away. As there was not enough snow, the horizontal trees were covered with earth during winter. The ground under the trees was always kept bare. Before fruit-bearing, superphosphate, potash salts and ammonium sulphate were applied and in addition, in 1940, liquid poultry manure which was made in the following manner: one-third of a barrel was filled with the manure and the rest with clean water. After fermentation had subsided, to every volume of liquor 10 volumes of water were added. Ten days after flowering, 10 buckets of the diluted liquid were poured into a hole in the ground near each tree. The varieties under trial came into bearing in the 4th, 5th and 6th years after planting. As a result of

3 years' observation some of the varieties, including Bessemjanka and Candille kitaika, were found to be immune to scab. Of the remainder, only the leaves and not the fruit were affected by it and, with the exception of Kitaika zolotaja and Reinette bergamotte, only slightly. All the Michurin varieties of apple ripened well in Minusinsk.

844. BELOHONOV, I. V. 634.1/2-2.111
Caré of orchards in the spring after frost damage.
Sady i Ogorody, 1941, No. 2, pp. 32-4.

Remedial measures include pruning back to any actively growing points or in severe cases cutting back right to the roots and regrafting on the stumps, using saddle grafts.

845. POTTER, J. M. S. 634.11-2.111
Frost injury to apples.
Agriculture, 1942, 49: 60-1.

Opportunity occurred at the R.H.S. commercial fruit trials at Wisley to make a classification of apples according to their degree of resistance to spring frosts. The classification is given for 43 varieties. Other observations made were: Dessert are more resistant than culinary varieties. The green-bud stage was the most susceptible, the injury being at the union of the pedicels; the open-blossom stage was very susceptible, the pistil being invariably killed. Blossoms escaping were usually on the underside of clusters. Trees on Malling XII proved more susceptible than those on Malling I and II. Late-keeping varieties were more susceptible than early or midseason varieties and young trees than fully grown trees.

846. FAWCETT, H. S. 632.8
Virus nomenclature.
Chron. bot., 1942, 7: 7-8, bibl. 3.

The need for a proper system of naming virus diseases for classification is discussed and some suggestions are considered. Some form of Latin binomial is desirable, of which the specific name should be derived from some one characteristic effect or significant relationship of the virus and not from the generic or specific name of the host, for the reason that the host may harbour more than one virus.

847. JOHNSON, J. 632.8
Virus nomenclature and committees.
Chron. bot., 1941, 7: 65-6.

A plea that the many proponents of individual schemes for virus nomenclature and classification should be less insistent in proclaiming their virtues. The author points out that the need of placing the virus in one of the three kingdoms or providing a fourth is not yet pressing, in fact, for the hypothesis has not yet been disproved, the "virus may be only certain molecules of one normal organism growing in the cells of another normal organism, thereby producing an abnormality which is known as a virus disease". In these circumstances and in view of the chaos which is already arising in virus nomenclature by reason of the multitude of cooks engaged in stirring the broth, it is suggested that, since a Standing Committee on Virus Nomenclature has been appointed by the American Phytopathological Society, it might be permitted to function unembarrassed. Such proposals as it eventually formulates will be presented to the International Committee on Virus Nomenclature nominated by the International Botanical Congress, in the event of those bodies retaining the vital spark at the conclusion of hostilities.

848. HILDEBRAND, E. M. 634.22-2.8
Rapid transmission techniques for stone-fruit
viruses.

Science, 1942, 95: 52, bibl. 1.

A number of virus diseases of stone fruit can be transmitted within a month (1 year being the normal time by the grafting method) by insertion of diseased buds about midway on the stems of rapidly growing seedlings between 12 and 24 inches tall, and by cutting off the stem one node above the diseased

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bud from 0 to 7 days afterwards to stimulate growth. In the experiments peach seedlings were used as being ideal for greenhouse experiments. Dormant stone fruits respond quickly to the grafting of diseased scions on to heavily pruned, healthy plants just as growth starts. Whip grafting transmitted a disease producing ring spot in sour cherry (*Prunus cerasus*) within 14 days, but almost any other type of graft will do. Reasons are advanced to account for the success of these methods. The technique would seem applicable to almost any woody plant.

849. KUNKEL, L. O. 634.76-2.8
False blossom in periwinkles and its cure by heat.
Science, 1942, 95: 252.

It was found possible to transfer false blossom virus from cranberry to periwinkle (*Vinca rosea*), potato, tomato, tobacco and *Nicotiana glutinosa* plants by means of dodder (*Cuscuta campestris*). Periwinkles infected with false blossom were cured by exposure to heat, i.e. 40° C. for 2 weeks, treatment for 1 week curing the tops only and not the roots. Experiments designed to test the possibility of similarly curing infected cranberries are in progress.

850. BODINE, E. W., AND KREUTZER, W. A. 634.21-2.8

Ring spot of apricot.

Phytopathology, 1942, 32: 179-81, bibl. 2.

Ring spot of apricot is shown to be a destructive virus disease of which symptom manifestation is delayed for 2 years. Both leaves and fruit are damaged. The disease appears to differ somewhat from the apricot mosaic disease of Bulgaria, nor is it caused by the peach mosaic virus.

851. REEVES, E. L., AND HUTCHINS, L. M. 634.25-2.8

Observations on the new so-called virus disease of peach trees in Washington.
Proc. Wash. St. hort. Ass. 36th annu. Meet. 1940, 1941, pp. 116-9, bibl. 2.

A progress report on Western X-disease, a virus disease of peaches.

Proc. Wash. St. hort. Ass. 37th annu. Meet. 1941, 1942, pp. 27-30.

The incidence of a most serious virus disease of the peach is increasing. In some of the orchards east of the Cascade Mountains from 10 to 20% of the trees were noticeably affected in 1940. The removal of affected branches does not eliminate the trouble. It is commoner in trees over 5 years old than in younger trees. Results of trials obtained in 1941 definitely establish the virus nature of the disease. It is not yet definitely established that the Western X-disease is the same as that reported on western chokecherry, but experiments on this point continue. Orchard surveys show that the Western X-disease is spreading in peach orchards in Washington and other north-western States. Observations indicate that the tree is not killed outright in a single season, although its infected parts become useless. On the average a tree will produce few, if any, saleable fruits in the third year after infection and none after the fourth year. The only known effective measure of control is the removal of the infected tree directly any symptoms appear, though there appears to be evidence that the removal of the roots may not be necessary. The symptoms of this and various similar disorders in the peach are described in the first article.

852. HILDEBRAND, E. M., AND PALMITER, D. H. 634.25-2.8

How to prevent destruction of New York State peach orchards by the new yellow-red virus disease.
Proc. N. York St. hort. Soc. 87th annu. Meet. 1942, 1942, pp. 34-40.

The X or yellow-red virus spreads only from chokecherry to peach and not from peach to peach. Experience and observations suggest that this disease will cease to be a menace to peaches if growers will buy only from reliable

nurseries, isolate young peach plantings for a minimum recommended distance of 500 feet from chokecherries, and, lastly, destroy all chokecherries within 500 feet of bearing peach orchards.

853. KUNG-HSIANG, L. 634.11-2.4
A physiological study of the susceptibility of the blushed and green sides of apples to certain fungous rots.

Phytopathology, 1942, 32: 239-45, bibl. 10.

Penicillium expansum and *Sclerotinia fructicola* rot the blushed side of an apple more slowly than the green side, because the blushed side possibly contains more insoluble pectic substance and is thus more resistant to these organisms, which are supposed to be intercellular and to penetrate through the cell walls by means of enzyme action. *Physalospora malorum* and *Lambertia corni-maris* showed no difference in their rate of rotting the two sides.

854. HADORN, C. 634.42: 634.11
Der Schorf und seine Bekämpfung. (Apple scab and its control.)

Schweiz. Z. Obst- u. Weinb., 1942, 51: 93-110.

Two seasons' trials in eight regions of Switzerland which differ from one another climatically lead to the following recommendations. Lime sulphur 32° Bé should be applied as the standard spray for scab, in 2% pre- and 1% post-blossom solutions. If a sticker is wanted in addition, copper oxychloride (32% metallic Cu content) 0.15%-0.2% solution or iron vitriol can be used. For sulphur-shy trees Pomarsol can take the place of lime sulphur, a 1% solution pre-blossom and calyx spray and 4% later. It can be mixed with copper oxychloride and lead arsenate.

855. HADORN, C. 634.42: 634.1/2
Untersuchungen über die Wirkungsweise der Vorratspräzierung. (Reservoir control of scab.)
Schweiz. Z. Obst- u. Weinb., 1942, 51: 139-48, bibl. 3.

The sprays which are found to give a prolonged period of protection against scab in Switzerland are a 4% bordeaux or "blue" spray and a 4% bordeaux + 1% lime sulphur or "brown" spray. The aim is to provide on the branches and twigs a fungicide which will gradually release copper into solution with each rain. Various experiments have aimed at determining the danger point when further applications of fungicide are necessary, and results in general indicate that when the copper content of the rain drops from treated branches falls below 0.2 g. per 100 litres of water a further spraying is necessary. Other results at Wädenswil suggest that in some cases there may be enough copper reserves left on the tree if only 0.1 g. copper is found in the drip water. The difficulty lies in the determination of this point, the collection of drips in flasks and analysis thereof needing time and skill. What is essentially wanted is a fungicide having the following characteristics:—(1) Great adhesive power and resistance to rain, (2) a small but continuous yield of about 0.3-0.4 g. of metallic copper per 100 litres rain water for a period of 3 months. In addition it would be immensely useful if something in the nature of litmus paper could be invented showing a definite reaction at the 0.2 g. per 100 litre stage with which the fruit grower could test the copper content of rain drips. He would test the drips at the ends of the outside branches. The author shows also how sprayed nets can be placed right over trees and the drips from these collected.

856. KEITT, G. W., AND MOORE, J. D. 634.11-2.42
Further experiments with ground spraying as an aid to apple scab control.

Wis. Hort., 1942, 32: 142-3.

In experiments by the Wisconsin Agricultural Experiment Station ground spraying with Elgetol substantially reduced the severity of an apple scab epidemic, especially in the early season period. It is suggested that Elgetol Regular I in

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200 should be applied to the ground shortly before bud break at the rate of 600 gallons per acre. Information is not yet sufficient to suggest the omission of any part of the regular protectant aerial spray programme.

857. WORMALD, H. 634.11-2.4

A stalk-end rot of apples.

Gard. Chron., 1942, 111: 220.

Two different unidentified species of *Phoma* and *Botrytis cinerea* were found in association with a stalk-end rot of growing apples. These fungi were shown to be able to infect apples in store but the conditions conducive to infection on the tree are not yet known.

858. WILKINSON, E. H. 632.482: 634.11

A note on the so-called dry eye rot of apples associated with *Botrytis cinerea* Pers.

A.R. Long Ashton agric. hort. Res. Stat. for 1941, 1942, pp. 72-5, bibl. 5.

A discussion of the phenomena observed during the incidence of dry eye rot of apples associated with *Botrytis cinerea*. Apple fruits attacked by it may subsequently develop botrytis rot in store. The behaviour of the disease is compared with that of chocolate spot of beans and botrytis rot of tomatoes.

859. SMITH, C. D., AND SMITH, D. J. 634.2-2.4

Host range and growth-temperature relations of *Coryneum beijerinckii*.

Phytopathology, 1942, 32: 221-5, bibl. 6.

The shot hole fungus, *Coryneum beijerinckii*, gave positive results of infection when inoculated on 35 species of *Prunus* and is probably omnivorous as regards the genus, though there are degrees of susceptibility between the species. In culture tests optimum development occurred at 19° C.

860. ARNAUD, G. 634.8-2.4

Développement des maladies de la vigne dans la région parisienne. (Vine disease in the Paris district.)

Ann. Épiph. Phytogén., 1940, 6: 37-46.

Observations made on the annual appearance of *Plasmopara viticola* on the vines in the neighbourhood of Paris, including the susceptibility of varieties and hybrids to mildew, the development of *Uncinula necator* and anthracnose and the resistance of vines to autumn frosts.

861. JENKINS, W. A. 634.848-2.4

Angular leaf spot of muscadines, caused by *Mycosphaerella angulata* n. sp.

Phytopathology, 1942, 32: 71-80, bibl. 6.

The perfect stage of the leaf spot disease of muscadine grapes in U.S.A., *Cercospora brachypoda*, is described for the first time and is named *Mycosphaerella angulata* n. sp. The disease may be controlled by 4: 5: 50 bordeaux spray applied at intervals of 2 weeks and so timed that the first application precedes the first heavy ascospore discharge in the spring.

862. KEITT, G. W., AND MOORE, J. D. 634.23-2.42

Some results from experimental spraying for cherry leaf spot.

Wis. Hort., 1942, 32: 166-7.

Three-spray and four-spray programmes used during the past season on Montmorency cherry at Wisconsin Experiment Station against leaf spot are discussed. Bordeaux 3-4-100 applied when three-fourths of petals have fallen, 2 weeks later, 4 weeks after the first spray, and just after harvest give good control and require only one-third of the copper sulphate used in three-spray programme of bordeaux 6-8-100. Tennessee Copper 34 plus lime 3-3-100, plus Orthex 1-800 in 4 applications timed as above lessened danger of foliage injury and of reduction in fruit size. It has given the best results of any insoluble copper material used in the experiments. Bordeaux made with high

magnesium lime gave distinctly less leaf injury than that made with high calcium lime.

863. ANON. 588.427: 632.48

Brown spot of passion fruit.

Agric. Gaz. N.S.W., 1942, 53: 93-4.

Brown rot of passion fruit (*Alternaria passiflorae*) can be very destructive in commercial plantations. Protective spraying with bordeaux 6-4-50 at monthly intervals in spring and summer and two-monthly intervals in winter will keep it in abeyance. The spray must reach the inner portions of the vines and an application should be given just after pruning.

864. DAINES, R. H. 634.25-2.48

Brown rot of peach and its control.

Circ. N.J. agric. Exp. Stat. 434, 1942, pp. 8.

865. DEMAREE, J. B., AND RUNNER, G. A. 634.8-2.3/4-2.6/7

Control of grape diseases and insects in Eastern United States.

Fmrs. Bull. U.S. Dep. Agric. 1893, 1942, pp. 28, 10 cents.

It is noted that European grape varieties, *Vitis vinifera*, are as a class very susceptible to disease and cannot be grown east of the Rocky Mountains except in a few favourable districts. The control measures recommended for the important pests and diseases discussed in this bulletin will, it is thought, suffice for all others likely to be encountered. The particular diseases dealt with are:—black rot (*Guignardia bidwellii*), downy mildew (*Plasmopara viticola*), anthracnose (*Elsinoe ampelina*), ripe rot (*Glomerella cingulata*), dead arm (*Cryptosporrella viticola*), powdery mildew (*Uncinula necator*), crown gall (*Phytoponas tumefaciens*), cotton root rot (*Phytopatrichum omnivorum*). All the above diseases are found on the *vinifera* grapes. The relatively unimportant diseases of the muscadine group of grapes are also briefly noted. The pests discussed are grape berry moth (*Polychrosis viteana*), grape leafhopper (*Erythroneura comes*), grape rootworm (*Fidia viticola*), rose chafer (*Macrodactylus subspinosus*), grape leaf folder (*Dermia funeralis*), grape vine aphid (*Aphis illinoiensis*). Methods of preserving good hygienic conditions in the vineyard are noted.

866. NEW YORK STATE AGRICULTURAL EXPERIMENT STATION. 632.6/7: 634/635

Current contributions on insect control.

Bull. N. York St. agric. Exp. Stat. 698, 1942, pp. 62.

Twenty-one articles by different workers on phases of current work on pest problems of fruit and vegetables in New York State. They are progress and not final reports.

867. HANSON, A. J., AND WEBSTER, R. L. 632.7: 634.71/5

Insects of the blackberry, raspberry, strawberry, currant and gooseberry.

Pop. Bull. Wash. agric. Exp. Stat. 164, 1941, pp. 40.

A revision of the 1938 edition of this well-illustrated bulletin (H.A., 9: 868). The list of insects of minor importance has been omitted.

868. FOX-WILSON, G. 632.753

Aphides, with special reference to their control.

J. roy. hort. Soc., Lond., 1942, 67: 199-205, bibl. 3.

The life cycle of aphids is described. Sprayed plants are often reinfested by migratory, winged aphids, by transportation by ants and, a fact often overlooked, by viviparous reproduction by females moribund from a slow contact wash. In aphid control the need of an effective and quick-acting insecticide is thus obvious. Nicotine is the best, but being poisonous cannot be used on maturing vegetables or fruit. Derris or pyrethrum sprays are recommended and

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are non-poisonous. Quassia is non-poisonous to man but does not affect all insects and is only a slow poison for aphids, though the young born during the period between spraying and death of the parent may sometimes succumb also to the residue on the leaf. This, however, is easily washed off by rain. The article concludes with instructions for the winter and spring treatments against aphids on fruit trees, vegetables and ornamental plants.

869. CALLENBACH, J. A. 634.11-2.753
Apple aphid and leaf roller control [in Wisconsin].

Wis. Hort., 1942, 32: 163-4.

The life histories of the apple-grain and green apple aphids and the fruit tree leaf roller are described. Control measures against the first named are doubtfully necessary or practical. The green apple aphid should be controlled by community co-operation. Its migratory powers render the efforts of individual orchardists more or less useless. Spraying with nicotine sulphate 1-800 is recommended whenever the aphids appear numerous. The dormant sprays often recommended are, the author considers, much overrated. The fruit tree leaf roller is controlled by a dormant oil spray used as an ovicide followed up by a heavy dosage of lead arsenate in the pre-pink (1-50), pink (2-50) and calyx (2-50) sprays. If a dormant spray is not applied, lead arsenate (3-50) should be applied in the pink spray.

870. McDANIEL, E. I. 634.75-2.76 + 2.729 + 648.7
Strawberry root weevils and crickets as household pests.

Ext. Bull. Mich. St. Coll. Agric. 230, 1941, pp. 4.

Suggestions are made for the control of strawberry root weevils by lead arsenate, poison bran bait, white arsenic or paris green bait and sodium arsenite bait, and of crickets by the use of any of the powders commonly used for cockroaches such as sodium fluoride, powdered borax, pyrethrum or rotenone.

871. BARBER, H. S. 634.711-2.76
Raspberry fruitworms and related species.

Misc. Publ. U.S. Dep. Agric. 468, 1942, pp. 32.

A detailed discussion from the taxonomic standpoint of the very many forms of beetle, to all of which for the last 130 years, according to the author, the generic name of *Byturus* has been incorrectly applied. A chronological review is included of the relevant literature.

872. KERR, T. W. 634.75-2.76
Control of white grubs [Phyllophaga spp.] in strawberries.

Bull. Cornell agric. Exp. Stat. 770, 1941, pp. 40, bibl. 7.

Provided further work shows that the yield of strawberries is not materially reduced by such action, the use of lead arsenate and sand is recommended when second-year grubs are particularly abundant in strawberry fields. The mixture, 1 lb. lead arsenate to 20 lb. air-dry sand, is stirred thoroughly to mix. It is applied by scattering 1.5 oz. in each hole when setting out the plants in the field.

873. HAYWARD, K. J. 634.1/7-2.77(82)
Algunas observaciones sobre las moscas de las frutas en la Argentina. (Observations on the fruit flies of Argentina.)

Rev. industr. agric. Tucumán, 1941, 31: 324-30.

The position in regard to fruit fly attack in Argentina is reviewed. The most frequent is *Anastrepha fraterculus*.

874. HAYWARD, K. J. 634.1/7-2.77-2.951
La lucha contra las moscas de las frutas. (Control of fruit fly.)

Rev. industr. agric. Tucumán, 1941, 31: 331-49, bibl. 40.

An account of the baits most used against fruit fly in various parts of the world and some results obtained in Argentina. The subject is very thoroughly dealt with. There is an

appendix in which results obtained with various baits are analysed and compared.

875. HARMAN, S. W. 632.78
Latest developments in codling moth control.
Proc. N. York St. hort. Soc. 87th annu. Meet. 1942, 1942, pp. 51-6.

Out of 12 sprays known to be useful in codling moth control the following are noted by the author as being particularly effective:—Lead arsenate 4-6 lb. in 100 gal., lead arsenate 2 lb. + oil 3 qt. in 100 gal., lead arsenate 3 lb. + nicotine sulphate $\frac{1}{2}$ pt. in 100 gal., nicotine sulphate $\frac{1}{2}$ pt. + oil 1 $\frac{1}{2}$ -2 qt. in 100 gal. and fixed nicotine 1 $\frac{1}{2}$ lb. + oil 2 qt. in 100 gal.

876. MUSTAFA, A. M., AND JANJUA, N. A. 632.78
Control of the codlin moth in Baluchistan.
Indian Fng. 1942, 3: 74-7.

The biology of the codling moth in Baluchistan is outlined. Control experiments covering four seasons are described. One calyx spray and 4 cover sprays were applied, the former when the calyx and lobes had formed cups and 90% of the petals had fallen, the latter 2 weeks, 3 to 4, 9 to 10 and 12 to 13 weeks after the calyx spray. The most effective formula proved to be lead arsenate 4 lb., fish oil 1 qt., water 100 gal. with casein as a spreader. Spray residue was removed by dipping in sodium silicate solution. The sprays are only effective if applied when the maximum number of eggs of the two broods are being laid. This can be discovered by bait-trapping the moths. The trap, which is illustrated but not described, appears to be an open pan attached to an erect pole set up among the trees on a level with the upper part of the crown. The pan contains molasses 1 part, water 9 parts and enough yeast to start fermentation. The bait is prepared in the morning and kept in the sun till required at night. Refilling is done weekly. The dates are determined by corroboration with the seasonal activities of the insect.

877. WADDELL, D. B., AND MARSHALL, J. 634.11-2.78
The calyx spray in codling moth control.

Sci. Agric., 1942, 22: 413-8, bibl. 8.

In the Okanagan Valley of British Columbia a calyx spray of lead arsenate applied by a spray gun when 90% of the petals had fallen was fairly effective in preventing the entry of codling moth larvae a month later and was still valuable 3 months after application. The paper deals chiefly with the laboratory investigations.

878. C.S.I.R. AUSTRALIA. 632.78: 634.1/7
Oriental peach moth investigations. General statement July 1941.

J. Coun. sci. industr. Res. Aust., 1942, 15: 77-80.

A brief progress report on investigations in the Goulburn Valley, Victoria, on control of the oriental peach moth, *Cydia molesta*. Its habits render the pest difficult to control by insecticides and it has not been possible to establish any parasite in spite of unusually persistent attempts.

879. WHITE, W. H., AND DAVIS, A. C. 632.64
Land slugs and snails and their control.
Fmn's Bull. U.S. Dep. Agric. 1895, 1942, pp. 8, bibl. 2.

Control measures recommended are:—(1) Hand picking. (2) Removal of hiding places such as loose boards, stones, etc., keeping premises dry and letting poultry in. (3) Use of hydrated or air-slaked lime either as a preventive band 3 or 4 in. wide and $\frac{1}{2}$ in. thick or applied to beds, use of salt—though this may harm vegetation. (4) Use of arsenical baits 1 pt. calcium arsenate, 16 pts. bran [by weight] and water to make a medium-moist mash applied broadcast on wetted ground every 5 days. This is dangerous to birds, poultry or stock. (5) Metaaldehyde, 1 oz. powdered meta to 3 lb. wheat bran, preferably distributed late in the evening.

880. BOURNE, A. I., AND OTHERS. 634.11-2.6/7+2.3/4
Apple pests and their control.
Leaf. Mass. St. Coll. Ext. Serv. 189, 1940, pp. 56.
 Pests and diseases of apples and their control in Massachusetts.

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE,
 U.S. DEP. AGRIC. 632.7
Squash borer (*Melittia satyriformis*), Corn earworm (*Heliothis armigera*), Fall armyworm (*Laphygma frugiperda*).
Picture Sheets 10, 11 and 12 respectively, 1941,
 2 pages each, 5 cents.

MINISTRY OF AGRICULTURE, LONDON. 632.693.2
Rats and their extermination with a note on grey squirrels.
Bull. Minist. Agric., Lond., 30 (6th Ed.), 1941,
 pp. 15, 6d.
 Mice, voles and field mice also receive mention.

881. SALISBURY, E. J. 632.51
The weed problem.
Nature, 1942, 149: 594-7.*
 Weeds not only crowd out crop plants, they also steal their nutrients, thus bracken needs potash in considerable amount and its growth may lead to potash starvation. White clover will take up very large quantities of molybdenum and thus become deleterious to cattle in districts such as the "tear" pastures of Somerset and elsewhere. In such districts, but not elsewhere, white clover can be considered as a weed. The aim with weeds is not the mere total destruction but the prevention of reappearance. Spraying with such substances as nitric acid, ammonium sulphate and cyanamide has been found in certain cases not only to eradicate the weeds but also to help the crop. Biological control is sometimes very successful, e.g. that of prickly pear in Australia, and there seems a possibility that bracken may at some future date be controllable by fungous treatment. The difficulty with all such control is to ensure that the parasite will not later turn its attention to more valuable crops. Weed seeds are sadly long lived: cart wheels, boots, clothes, etc., all help to disseminate them. Their partial eradication may be even less effective than no treatment at all. In many weeds, e.g. creeping sorrel and bindweed, small bits left in the ground will soon start a fresh growth. Before any attempt is made to deal with weeds a study of their habits and preferences is essential.

882. DARLINGTON, H. T., BESSEY, E. A., AND MEGEE, C. R. 632.51
Some important Michigan weeds.
Spec. Bull. Mich. agric. Exp. Stat. 304, 1940,
 pp. 216, bibl. 32.
 Ninety-four important weeds of Michigan are described with full-page illustrations. Of them no less than 70% were imported from the Old World. Several useful pages are devoted to control methods.

883. WISCONSIN COLLEGE OF AGRICULTURE. 632.51
New chemical kills poison ivy.
Wis. Hort., 1942, 32: 241.
Rhus toxicodendron, poison ivy, a dangerous weed in Wisconsin orchards and elsewhere, has been apparently completely controlled by an ammonium sulphamate spray, $\frac{1}{2}$ to 1 lb. per gal. water, applied at the rate of 1 gal. per 100 sq. ft. in June. All previous weed killers have proved unsuitable for one reason or another.

884. ANON. 632.954
Ammonium sulfamate—its herbicidal properties.
Agric. News-Letter (Du Pont), 1942, 10: 1: 6-8.
 Ammonium sulphamate, a non-inflammable compound, considered non-toxic to livestock, is particularly adapted for

* Being the substance of a lecture delivered at the Royal Institution on 30 April, 1942.

the control of certain weeds. It appears to kill through translocation from leaves to roots and through direct absorption by roots when applied to the soil. Rapidity of action increases with increased humidity and rainfall. Some grasses are easily killed, but others, e.g. Bermuda grass (*Cynodon dactylon*) are resistant. When combined with certain other chemicals ammonium sulphamate can be weakened sufficiently to kill out broad-leaved weeds while leaving grass uninjured.

885. ATKINSON, J. D., AND TAYLOR, G. G. 634.1/2-2.95
Experimental work on the Havelock North orchard.
N.Z. J. Sci. Tech., 1941, 23: 9A-12A, bibl. 3.
 Tests (extending over the period 1936-1940) demonstrating the effectiveness of a modern spray programme for apples are briefly reported. Experiments designed to improve spray practice are discussed, and results obtained are summarized in the form of an amended programme. [Authors' summary.]

886. PARKIN, E. A. 632.951
Biological assay of insecticidal sprays.
Nature, 1942, 149: 720-2, bibl. 4.
 The Pest Infestation Laboratory of the Department of Scientific and Industrial Research is carrying out a study of insecticidal sprays to be used as a control measure on stored grain, dried fruits, cacao, etc. Special attention has been given to the development of a method of comparing the killing power of different sprays. The technique of this test is described.

887. KEARNS, H. G. H., AND MARSH, R. W. 634.1/7-2.95
A summary of fruit spraying programmes. 1942 revision.
A.R. Long Ashton agric. hort. Res. Stat. for 1941, 1942, pp. 59-69.
 This amounts to a revision of the spray programme recommended in the annual report for 1936, pp. 75-89, *H.A.*, 7: 663, based on recent research on optimum concentrations of old sprays and the introduction of new ones such as the dinitro-orthocresol petroleum washes. The spray programmes concern apples, pears, plums, cherries, black currants, red currants, gooseberries, raspberries, loganberries, blackberries and strawberries.

888. CRESSMAN, A. W., AND DAWSEY, L. H. 632.951.8
Insecticidal efficiency of some oils of plant origin.
Tech. Bull. U.S. Dep. Agric. 801, 1942, pp. 15, bibl. 13.
 Laboratory experiments carried out with crude corn, cotton seed and peanut oils on Mexican mealy bugs and certain scales showed that those crude oils gave a higher kill and heavier oil deposits than equivalent concentrations of petroleum oil. Coconut oil mixed with petroleum gave smaller deposits and killed fewer mealy bugs than an equal concentration of petroleum. The ovicidal effects of the oils were closely correlated with their drying properties. Orange oil and pine oil had little effect and damaged the plants. Plant tolerance tests gave such variable results that tolerance would have to be determined each time under conditions prevailing at the time of spraying. Vegetable oils cost more than petroleum but possessing superior solvent action for certain organic insecticides may prove useful on this account.

889. YARWOOD, C. E. 632.952.21: 632.421.1
Stimulatory and toxic effects of copper sprays on powdery mildews.
Amer. J. Bot., 1942, 29: 132-5, bibl. 11.
 It is shown that a given dose of copper may be toxic, neutral or stimulatory to the powdery mildew studied (*Erysiphe polygoni*), depending on environment and other conditions of the tests.

890. HEUBERGER, J. W. 632.952

Tenacity of protective fungicides.

Chron. bot., 1942, 7: 9-10, bibl. 2.

The nature of and several factors involved in the tenacity of protective spray fungicides are discussed. There are also described some methods of determining and evaluating tenacity in the laboratory, including results obtained with some copper compounds. Laboratory and field data on tenacity appear to be comparable. The methods described are suitable for accurate laboratory testing of materials which cannot be tested under field conditions.

891. FALLSCHEER, H., AND OVERLEY, F. L. 632.951/2

Experiments and trends in spray residue removal.

Proc. Wash. St. hort. Ass. 37th annu. Meet. 1941, 1942, pp. 119-26.

A discussion on the most economic methods of washing fruit to comply with the latest Federal regulations, whereby lead residue tolerance is .05 grains per pound and fluorine tolerance .02 grains per pound, without damaging the storage quality.

892. BRIGHTWELL, S. T. P. 632.951.1

Fumigation by smokes with special reference to derris and pyrethrum. A survey of recent literature.

Bull. imp. Inst., Lond., 1942, 40: 6-11, bibl. 30.

Smokes from burning derris and pyrethrum powders are toxic to some insects. The toxicity of derris smokes is due to some volatilized rotenone, the decomposition products of the other constituents of the root and any additions made to the root powder. The toxic action of pyrethrum smoke

is derived from the products of combustion of the non-pyrethrins present. The effect of the smokes can be enhanced by careful attention to the added substances and to the manner in which the smoke is produced. A compact apparatus has been contrived consisting of fan, heater and distributor which will form a dense aerosol* having a toxic action equal to the smoke produced by simple burning of amounts of pyrethrin or rotenone powders containing 20 times as much of the insecticidal principles. No carbonization remains and very little of the actual insecticidal constituents are lost during dispersal. Mixtures of pyrethrum oleoresin and rotenone show toxicities greater than the sum of those due to the constituents when used singly. Of this apparatus it is said that the range of materials that can be used as fumigants has been much extended, not only embracing possible new substances but also permitting the application of old insecticides in new situations.

893. SWAN, D. C., AND STEPHEN, V. A. 632.944

An injector for liquid fumigants.

J. Aust. Inst. agric. Sci., 1942, 8: 26.

The injector described and illustrated was primarily designed to introduce small measured doses of carbon disulphide into bagged wheat for weevil control. It could, however, possibly be used in small scale soil fumigation, as in pots in greenhouses and with other liquid fumigants.

894. PARKER-RHODES, A. F. 632.95

The fungicidal action of copper and sulphur.

A.R. Long Ashton agric. hort. Res. Stat. for 1941, 1942, pp. 83-5.

* *Aerosol*, a term here used to include all the various colloidal disperse systems in air.

VEGETABLES, DRUGS, STIMULANTS, ETC.

895. TAYLOR, H. V. 635.1/7

Problems in vegetable production. Introductory.

Ann. appl. Biol., 1942, 29: 197-9.

Dr. H. V. Taylor notices briefly the question of making good the loss of vegetable imports, the problem of their seed supply in general and problems associated with certain crops. *Onions*. Imported American onion seed germinates and grows well but the bulbs start to ripen prematurely when no bigger than walnuts. The yield is barely 3 tons per acre or only half that from European seed. The cause is not discussed. Onion sets as used in Britain are very small onions (½ inch diameter) imported from Greece and Eastern Europe to be grown to full size in this country, being more successful than seed in north-west England and in Scotland. They are said to receive special treatment in the countries of origin to prevent flowering. British-raised onion sets merely run to seed. This problem is under investigation. Onion seedlings cannot compete with weeds and require hand weeding for which labour is not available. A spray noxious to weeds and harmless to onions is required [see *H.A.*, 12: 956 and 957]. The bulb-necking of onions due to adverse weather conditions is mentioned. *Carrots*. Cracking often damages 25% of the crop and is said to be due to heavy rains following a dry period. Experiments are in progress to determine the value (if any) of humus, of nitrogen and of potash in increasing or decreasing this disorder. *Leeks*. Wet summers result in shortage of leek seed. Can leek seed be so treated as to produce earlier flowering and seeding? *Brassica*. Club root of brassica is rife. What happens to the club root and fungus diseases in the compost heap to which brassica waste is now consigned? Does the heat destroy or incubate them? *Dried peas and haricot beans*. A suitable spray fungicide is needed to control *Botrytis* (?) which attacks the pod and discolours the seeds in wet harvest weather.

896. TAYLOR, H. V. 635.1/7

Looking ahead. Past records and future achievements [in wartime vegetable production].

Fruitgrower, 1942, 93: 241-2.

The Commissioner for Horticulture reviews the recent past and makes suggestions for the future in wartime vegetable production. He groups vegetables into two classes, (a) First essentials:—carrots, peas, broad beans, haricot beans, parsnips, horticultural rape, garden beet, lettuce, spinach, tomato, sprouting broccoli, leeks, parsley, sprouts, cabbages, savoys, kales; (b) second essentials:—onions, runner and dwarf beans, spinach, beet, Swiss chard, heading broccoli, cauliflower, cress. Second essential are those which, while of lesser nutritional importance, are valuable because of their palatability.

897. TAYLOR, H. V. 635.1/7

More winter vegetables are needed.

Agriculture, 1942, 49: 21-4.

The various properties of a number of winter vegetables are explained and suggestions made as to what should be grown to compensate as far as possible for reduced meat and dairy products. The drilling of Brassicae in the field with thinning later in preference to transplanting will save labour though it will treble the amount of seed required. Plants so treated seem to suffer less frost damage and in the case of kale to crop better.

898. ROYAL HORTICULTURAL SOCIETY, LONDON. 635.1/7

The war-time kitchen garden.

J. roy. hort. Soc. Lond., 1942, 67: 149-52.

Instructions for the management of the vegetable garden have been published monthly from the beginning of the year and are continuing. The information provided is comprehensive and contains many "tips" which cannot fail to be

useful. Some hints on gathering crops are summarized below. It is unwise to tug at peas if the stems are tough, or the whole plant may be lifted. Spinach leaves are better cut than broken, old leaves should be removed regularly to keep the plants growing. Brussels sprouts should be picked a few at a time from each plant starting at the bottom. To retain their freshness lettuces should be pulled up by the roots which should not be cut off till required. Production of peas, beans and marrows will continue longer if they are picked when fully formed but not mature. Marrows are best cut when 9 inches long; those formed later may be retained for storing. Carrots and turnips can be pulled up if the soil is not too hard, while beetroots must always be dug to avoid bleeding during cooking. When used young, only enough for immediate requirements should be taken. Leeks should be kept in the ground for winter and spring use.

899. BEWLEY, W. F. 635.1/7: 631.544
Some problems of the glasshouse industry in wartime.

Ann. appl. Biol., 1942, 29: 199-200.

I. The treatment of soils not recently cultivated on glasshouse floors so as to render them suitable for tomatoes is discussed. The soil is broken up not later than October. If dry it is wetted to a depth of 20-24 inches. Hydrated lime 8 oz. and superphosphates 4 oz. per sq. yd. are spread and the soil is ridged 18 in. high and 18 in. wide, the lime and superphosphate being uniformly mixed in. Six-eight weeks later the ground is levelled, sterilized with steam or formaldehyde and wheat or oat straw incorporated as almost vertical walls. II. Wartime fertilizer treatment may consist in the application of (a) horse manure, (b) potash or (c) plant ash. For (a) mainly substitutes will have to be used. Compost prepared with Adco is suggested, especially that made from selected tomato shoots and leaves, coarse grass and nettles, the latter being particularly rich in potash, bracken or seaweed. (b) Sulphate of potash is rationed at 8 cwt. per acre for tomatoes. Muriate of potash cannot be supplied for this crop under glass. Substitutes are fine and cement dusts and the so-called "organic" potash. A preliminary test is advisable, since some potash salts have harmed the plants. (c) The ash of grass, young bracken, hedge clipping, weeds, especially nettles, supplies a fair amount of potassium carbonate. The material must be reasonably dry when ready for burning.

900. MINISTRY OF AGRICULTURE, LONDON. 635.1/8: 631.544
Crop production in frames and cloches.

Bull. Minist. Agric., Lond., 65 (3rd Ed.), 1942, pp. 45, bibl. 6, 1s.

This bulletin which has been completely revised since its 2nd edition in 1937, *H.A.*, 7: 789, provides information on the most modern methods of frame cultivation suitable for English cultivators. Dutch and English lights are described in considerable detail and with useful illustrations, and the methods of heating, including that of electricity, are discussed. The systems of production of crops both in heated and unheated frames are detailed with notes on suitable crops and varieties thereof. Only a brief note is given on diseases and pests. Three pages are devoted to cloche cultivation, both the bell cloche and the continuous cloche favoured by some growers (see also *H.A.*, 12: 317). Finally notes are given of such other protectors as cap glasses or conicals, round zinc rims, and collapsible sun boxes.

901. MINISTRY OF AGRICULTURE, LONDON (TAYLOR, H. V., AND JOHNSTONE, K. H.). 635.5
Salad crops.

Bull. Minist. Agric., Lond., 55 (3rd Ed.), 1941, pp. 66, bibl. 21, 1s. 6d.

Since its last revision in 1937, *H.A.*, 7: 788, this bulletin has again been overhauled and brought up to date with recent

experience. Tomatoes are not included. Of the other crops lettuce holds pride of place with 38 pages devoted to it. Considerable attention is paid to its cultivation in frames with special note of the use of Dutch Lights and the French gardening system. The section on its cultivation in particular districts is now omitted, but there is a new and welcome section on control of disease and pests. Other crops dealt with more briefly are endive, chicory, radish, mustard and cress, corn salad, dandelion and watercress.

902. HOARE, A. H. (MINISTRY OF AGRICULTURE, LONDON). 633.8
Culinary herbs and their cultivation.

Bull. Minist. Agric., Lond., 125, 1942, pp. 17, 4d.

The information in the present bulletin is, with certain amendments, that given in the relevant sections of *Bull 76* issued by the Ministry in 1936 (*H.A.*, 6: 238). The herbs considered are parsley, mint, sage, tarragon, thyme, fennel, sorrel and more briefly borage, chives, chervil, marjoram, savory, balm, basil, southernwood and tansy.

903. CHARRIÈRE, J. 635.1/7
La culture intensive au potager. (Intensive vegetable culture.)

Rev. hort. Suisse, 1942, 15: 39-41.

Three classes of vegetable are distinguished, those comprising the main or long-standing crop, those which can be grown between the rows of the principal or long standing crops, and those which occupy the ground before or after the main crop but not simultaneously. By this method a small parcel of ground can be made to give a high yield. A planting plan is given showing how the various crops can be dovetailed into the scheme.

904. CHARRIÈRE, J. 635.1/7
Comment cultiver nos principaux légumes. (Cultivation of vegetables in Switzerland.)

Rev. hort. Suisse, 1942, 15: 25-38.

Compressed cultural instructions are given for a large number of vegetables in Switzerland. The information includes, in addition, the amount of seed or plants required for a given area, the probable yield and lists of selected varieties, mostly of continental origin.

905. HOBBS, E. W. 635.1/7
Observations on the cropping of 10-rod war-time allotments—season 1941.

A.R. Long Ashton agric. hort. Res. Stat. for 1941, 1942, pp. 49-53.

Further notes on progress made since the last report, *Ibidem* for 1940, pp. 42-9, *H.A.*, 11: 781.

906. ZASYPKIN, A. S. 635.1/7: 631.544
Production of earlier vegetables in the open. [Russian.]

Sady i Ogorod, 1941, No. 1, pp. 12-4.

Three methods of hastening the growth of vegetables in the open are described. 1. They are planted in pots made of peat and turf soil which are neutralized by the addition of lime in the summer and left to weather. To the mixture artificial fertilizers are added to suit the particular crops to be grown, the pots are moulded, filled with compost and receive the seed or plants. 2. The early sown seed or plants are protected by hoods of paraffin-wax paper, cut into octagons, 50 to 60 cm. in diameter, and folded. They are removed when frosts are over. Glass may also be used for the purpose. 3. Hotbed cultivation, using fresh dung or rotting vegetable refuse and frame lights, with mulch paper or paraffin-wax paper for protection. By all three methods it has been found possible to get vegetables a month or more earlier than by ordinary methods.

907. RAMSEY, G. B., AND WIANT, J. S.

632.3/4: 635.31 + 635.25 + 635.65
+ 635.13 + 635.53 + 635.78**Market diseases of fruits and vegetables.** Asparagus, onions, beans, peas, carrots, celery and related vegetables.*Misc. Publ. U.S. Dep. Agric.* 440, 1941, pp. 70, bibl. 226, 35 cents.

Clear accounts are given of the market diseases, disorders due to injury in transit or weather, and in some cases pests of the vegetables mentioned in the title, the vegetables related to celery being fennel (finocchio), parsley and parsnip. The illustrations, many of them in colour are very helpful.

908. MIHALOVA, L. 635.1/7: 581.143.26.03

Vernalizing vegetable seeds. [Russian.]
Sady i Ogorody, 1941, No. 2, pp. 13-5.

Highly successful results are reported from seed vernalization of root crops, carrots in particular. There was much less inferior stuff in the crops of carrots from vernalized seed than in those from unvernalized seed. Vernalized seed after even germination gave good yields of carrots which stored well and produced good quality seed. Only if the process of vernalization was continued too long was there a tendency for the resulting plants of certain varieties to bolt. In such cases vernalization should not exceed 15-20 days. Results with other vegetables were as follows:—Cabbage: no records kept but results of 3 years' work favourable; tomato: total yield increase of 14-30% and a greater proportion of ripe fruit; beetroot: harvest date advanced by 5-10 days, but a tendency to bolt in 2-5% of the crop noticeable. As regards the beet it is suggested that the vernalization treatment should not exceed 12 days, germination being effected at a temperature of not less than 15° C, and vernalization at 0°—1° C.

909. SCHMIDT, H. 631.531.17

Weitere Beizversuche an gärtnerischem Saatgut. (Further seed pickling experiments with garden seeds.)*Landw. Jb.*, 1940, 90: 697-711, bibl. 16.

Experiments are recorded from Pillnitz on Elbe on 9 new seed pickling materials not yet on the market, containing lower mercury contents than usual, 7 of them being in dry and 2 in wet form. The plant material consisted of seeds of tomatoes, beans, sweet peas, stocks and snapdragons.

910. MINISTRY OF AGRICULTURE, LONDON [WALLACE, T., SECRETT, F. A., AND BEWLEY, W. F.]. 635.1/7: 631.8

Manuring commercial vegetable crops.*Growth Bull. Minist. Agric., Lond.*, 6, 1942, pp. 10, 3d.

At the end of this timely and useful bulletin the manurial treatment of particular vegetable crops is tabulated under stable manure, organic manures and fertilizers (normal), ditto (war), topdressing. A pre-essential to successful vegetable production is the building up and maintenance of soil fertility and for this the following conditions are essential. (1) Soil must be of sufficient depth and without pan in the subsoil. (2) Drainage must be adequate at all times of the year. (3) The soil should not be more than slightly acid (pH above 6.0) and should have a small reserve of carbonate of lime. (4) It must have plenty of organic matter, some of it actively decomposing. (5) It must possess adequate potash and phosphates. The problem of ensuring these are considered in detail. Potash is at present very scarce and that which is imported is muriate of potash containing 60% K₂O. This is quite suitable for vegetables and potatoes provided it is applied a week or two before seed-sowing or planting. Flue dust may contain harmful ingredients but is generally safe if allowed to weather in the soil for a period (*sic*) before cropping: risk from its use will be further decreased by the

presence of lime in the soil. Heavy dressings of wood ashes are liable to cake heavy soils unless well mixed in with it by forking or other means. Neither flue dusts nor wood ashes should be used for top dressing: when available nitrate of potash should be used for this purpose. Salt can only be a substitute for potash for such crops as mangolds, sugar beet and probably garden beet. If occasional dressings of farmyard manure can be given there will be little risk of deficiencies of phosphate and potash. Most old market gardens will probably have adequate supplies of phosphates on which to draw during the war. Other possible deficiencies are (1) Boron. This can be remedied by dressings of borax or boric acid incorporated in fertilizers and used at 20 lb. an acre: it may be accentuated by over-liming. (2) Manganese. To remedy, use good quality stable manure, dust or spray foliage with manganese sulphate (up to 60 lb. per acre) or chloride, or apply sulphur to soil in form of finely ground powder or as flowers of sulphur at 10-20 cwt. per acre. (3) Magnesium. To eliminate this deficiency dress with 10-20 cwt. of ground high grade magnesium limestone containing 40% magnesium carbonate: the effect should last for several years. When new land is being brought into vegetable culture the most suitable crops to grow during the grading up period will be early potatoes, brassicas, except cauliflower and spring cabbage, swedes, parsnips, peas and various beans.

911. WALLACE, T. 635.1/7: 631.8
Some aspects of the nutrition of vegetable crops.*Ann. appl. Biol.*, 1942, 29: 200-4, bibl. 10.

The paper discusses the building up and maintenance of soil fertility for intensive vegetable production. Each of the nutrient-elements, including some of the trace elements, is dealt with in turn, with mention of the special requirements of particular crops.

912. WALLACE, T., AND OGILVIE, L.

635.11: 632.19: 546.711

Manganese deficiency of agricultural and horticultural crops. Summary of investigations, season 1941.*A.R. Long Ashton agric. hort. Res. Stat. for 1941*, 1942, pp. 45-8.

Experiments are reported on the use of manganese sulphate, manganese chloride and manganese ores (manganese dioxide), used as fertilizers, and on the use of manganese sulphate and chloride used as sprays, for the control of the deficiency in globe beetroot. Manganese sulphate and chloride used as fertilizers, at rates equivalent to 100 lb. MnSO₄ per acre, were only effective in combating the deficiency during the earlier stages of the crop. The ore used at similar rate was practically ineffective at all stages. Manganese sulphate and chloride were very effective as sprays when applied to half-grown plants or in the later stages of growth at rates between 5 and 40 lb. per acre. The former of these rates was sufficient for commercial control of the trouble. [From authors' summary.]

913. WALLACE, T., JONES, J. O., AND PLANT, W.

631.8: 635.13: 581.192

A note on the effects of farmyard manure and of various fertiliser treatments on the content of ash and mineral constituents of ash in the carrot crop.*A.R. Long Ashton agric. hort. Res. Stat. for 1941*, 1942, pp. 40-4.

Ash and mineral constituents were determined of the roots and tops of carrots at two stages of growth in carrot manurial plots. Significant differences in ash, potash, soda and chloride content were found as the result of the different treatments. Relationships between potash and soda contents were indicated. The amount of potash necessary for an average crop of carrots was calculated. The importance to potash supply of not removing the carrot tops from the field is shown.

914. GARRAD, G. H. 631.83: 631.828
Agricultural salt as a substitute for potash.
Kent Fmr's J., 1942, 51: 36.
 By the application of sodium compounds such as agricultural salt some of the excess potash left over from the previous season is made available for the following season. Crops known to benefit are mangels and sugar beet and most probably others of a similar nature. Potatoes are definitely harmed by it. Agricultural salt used at the rate of 5 cwt. per acre at 24 centres in 1940 gave an increase of 18 cwt. of washed beet per acre. The dressing should be applied some days before drilling, otherwise the germination and early growth of the crop may be delayed. Because of its dampness the salt should not be mixed with other fertilizers before application.

915. ASSOCIATION OF APPLIED BIOLOGISTS. 632.765
Symposium on wireworm investigations.
Ann. appl. Biol., 1942, 29: 144-96.
 FRYER, J. C. F.
 I. *Investigations on wireworms: introductory*, pp. 144-9.
 JARY, S. G.
 II. *Wireworms and crop production*, pp. 150-5, bibl. 2.
 YATES, F., AND FINNEY, D. J.
 III. *Statistical problems in field sampling for wireworms*, pp. 156-67, bibl. 4.
 EVANS, A. C., AND GOUGH, H. C.
 III. *Observations on some factors influencing growth in wireworms of the genus *Agriotes* Esch.*, pp. 168-75, bibl. 9.
 MILES, W. H.
 IV. *Wireworms and agriculture, with special reference to *Agriotes obscurus* L.*, pp. 176-80, bibl. 5.
 COHEN, M.
 V. *Observations on the biology of *Agriotes obscurus* L. I. The adult insect*, pp. 181-96, bibl. 21.

The above papers formed part of the Proceedings of the Ordinary Meeting of the Association of Applied Biologists, 10 October 1941.

916. MUGGERIDGE, J. 632.765
Wireworms.
N.Z. J. Agric., 1942, 64: 321, 323-4, bibl. 3.
 An account of the wireworm in New Zealand and suggested measures for its control.

917. WALLACE, J. C. (MINISTRY OF AGRICULTURE, LONDON). 633.491
Potatoes.
Bull. Minist. Agric., Lond., 94 (2nd Ed.), 1941, pp. 51, 1s.
 The author has revised the first edition of this bulletin issued in 1938 in the light of present circumstances and thereby provides an excellent guide to all who propose to grow potatoes whether on a commercial scale or in their own gardens. Information is also given on harvesting, marketing and storing. It is interesting to note that the use of immature seed leads to heavier crops, possibly owing to it being less infected with virus. The deterioration of stocks grown year after year in the south is due to such virus diseases as leaf roll, mosaic, etc., which are carried from plant to plant by aphides or greenfly. In the north aphides are either not so prevalent or make their appearance late in the season, so that the potato plants grown there die down before the disease reaches the tubers. As regards the use of cut seed the author notes that large tubers may be cut, provided the cut sets are planted and covered immediately or otherwise prevented from losing natural sap. Cutting of the sets is not usual where seed tubers are sprouted.

918. (LARGE, E. C.). 633.491: 581.14
How potatoes grow.
Fmr & Stk-Breed., 1942, 56: 798-9.
 A series of scale drawings made at frequent intervals show growth progress of the potato plant above and below ground.

919. WERNER, H. O. 633.491: 612.014.44+551.52
Relative response of several varieties of potatoes to progressively changing temperatures and to photoperiods controlled to simulate "northern" and "southern" conditions.
Amer. Potato J., 1942, 19: 30-40, bibl. 4.
 Six varieties of potato were grown in the greenhouse under conditions made to resemble northern and southern conditions of temperature and photoperiods. In all the varieties tested yield was higher and growth stronger under the northern type of environment and varietal differences were more manifest. Ratio of weight of tubers to that of the tops was, however, consistently higher under southern conditions.

920. (BELL, G. D. H., AND OTHERS.) 633.491-1.532.2
Seed potato cutting experiments.
Agriculture, 1942, 48: 231-4.
 Experiments conducted by various workers at Cambridge in 1940 and 1941 with Majestic and 6 early varieties are reported. In 1941 the interval between cutting and planting was extended from 6 to 34 days. The shorter intervals both for cut seed and cut ware gave the best results but even at 34 days there was 84.5% success for cut seed and 70% for cut ware. (Uncut seed 95.5%, cut seed at 6 days 89.5%; uncut ware 95.3%, cut ware at 13 days 76.7%) Cutting tubers direct from the clamp without preliminary sprouting led to no appreciable loss. Cut seed size tubers behaved satisfactorily and the practice can be recommended in times of tuber shortage. There was a lower yield per acre because heavier sets will always produce the heavier yield. Normal soil conditions in Britain are not inimical to freshly cut sets. Well-healed cut sets should nevertheless be preferred in wet soils. Cutting will always slightly reduce yield per acre, but closer planting will correct this, in fact with cut or uncut seed planting distance adjusted to the size of the set would make the most efficient use of the acreage available. In 1940 when experiments were carried out with boxed and sprouted tubers practically full stands were obtained with ware cut 1, 3 and 6 days before planting. Treatment of the cut surfaces with slag, lime or ashes was of no benefit when cut tubers were planted immediately. Considerable rotting occurred if tubers were exposed to drying conditions of sun and wind before planting.

921. BELL, G. D. H., GILSON, M. R., AND WESTON, W. A. R. D. 633.491-1.532.2
Experiments on cutting potato tubers.
J. agric. Sci., 1942, 32: 255-73, bibl. 10.
 Ware size tubers of Arran Banner, King Edward and Majestic were obtained from Scotland and were planted whole and cut at Cambridge. When the cut sets were planted at the same distance as whole sets there was a reduction in yield per acre in all three varieties and in all categories of crop, i.e. ware, seed and chats, but it was obvious that the total return can be increased considerably by cutting since double the number of plants are obtainable. No benefit resulted from dusting the cut surfaces of tubers of Majestic with slag, lime or ashes and adverse effects resulted from the use of a fungicide and alum. Small scale pathological observations with other varieties showed that the exposure of cut sets to drying conditions lowers their resistance to attack by micro-organisms and encourages the breakdown of the tuber flesh by bacteria of the *carotovorum* group. The treatments in the main trial consisted of tubers cut 6 days, 3 days, 1 day and immediately before planting, the control being the uncut tubers. Only healthy and vigorous sets were used. The tubers were halved

longitudinally, care being taken that each half possessed an approximately equal distribution of good sprouts. The cut sets kept for the varying lengths of time before planting were replaced in the sprouting boxes, rose end uppermost, with the cut surfaces exposed as much as possible by stacking the sets with the cut surfaces pointed in one direction. Irrespective of delay in planting and of cutting extreme uniformity in plant establishment was shown in all varieties and in all plots. In general it was shown that the use of certain fungicides, either directly on the cut surface, or as a means of moistening sack coverings is not to be recommended owing to the resultant adverse effects of the fungicide on the natural resistance of the live tissue of the tuber.

922. ELMER, O. H. 633.491-1.532.2
Prevention of potato seed piece decay.
Amer. Potato J., 1942, 19: 19-23.

It is desirable for greatest vigour that the potato seed piece should remain sound until all stored food has been utilized by the plant. Under eastern Kansas conditions decay can largely be prevented through appropriate fungicidal treatments of the seed piece. A number of treatments are noted and compared. A successful treatment, resulting in an average of 99% sound seed pieces consisted of a momentary dip of tubers in 3 or 4 parts corrosive sublimate to 500 parts water acidulated by 1% hydrochloric acid. Another almost as good was a one minute dip of tubers in a solution of 1 lb. yellow oxide of mercury to 15 gallons of water. Suberization of cut seed was less effective than the above treatments, as was the coating of the seed pieces with dry hydrated lime, gypsum, sulphur or equal parts of hydrated lime and sulphur. Acidulated corrosive sublimate proved the most successful of all treatments in sterilization for tuber-borne *Rhizoctonia sclerotia*. The potato variety was Irish Cobbler and the experiments covered 6 years to 1940.

923. SURDUTOVICH, J. M. 633.491-1.544
Growing potatoes from sprouts without artificial heat.
Sady i Ogorody, 1941, No. 2, pp. 30-1.

The essentials in growing potatoes from sprouts appear to be firm planting, protection from the sun until roots are formed, high moisture content of the soil prior to root formation, and a friable, well-dugged soil.

924. MÜLLER, K. O., AND ORTH, H. 633.491
Über einen Spätpflanzversuch mit Kartoffeln.
(Late planting of potatoes.)
Ernähr. Pfl., 1941, 37: 37-40.

Experiments were made with potatoes in the hope of finding a variety which might be used in conjunction with a winter catch crop on light soils. It was necessary to find one that was quick growing, that would produce tubers under short-day conditions, that was resistant to *Phytophthora* and that would stand up to a two-month storage without sprouting. The variety BRA 5/31 was found to approximate to these conditions. Its growing period was 6 weeks less than most. It is resistant to the *Phytophthora* biotypes of group A. It was found to contain considerably more arginin than the four other varieties tested. Its yield, though on the low side, was sufficient.

925. KRAVCHENKO, P. N. 633.491-1.544
Forcing early potatoes. [Russian.]
Sady i Ogorody, 1941, No. 2, pp. 28-30.

A plea for drying and sprouting early potatoes prior to planting. Drying is carried out at 12° to 15° C. for 1-2 weeks till about 5% loss of moisture has been incurred. The tubers are then sprouted in slatted boxes or on peat or sawdust for 30-40 days resulting in a further 10% loss of moisture. During sprouting they are kept at 15°-18° C. and kept moist.

926. REINMUTH, E., AND ENGELMANN, C. 633.491-1.561.3

Der Einfluss der Pflanzzeit auf Zystenbesatz, Wachstum und Ertrag zweier in nematodenversuchtem Boden angebauter Kartoffelsorten. (The effect of planting time on the number of cysts, growth and cropping of two potato varieties in eelworm-infested soil.)

Landw. Jb., 1940, 90: 519-34, bibl. 8.

Time of planting had considerable effect on cropping but not so much on the incidence and number of eelworm cysts. The early variety July was considerably influenced by environmental factors, i.e. eelworm and weather conditions throughout its growth, but the midseason variety Ackersgegen was only affected by them in its early growth stages.

927. MATTINGLEY, G. H. 633.491-1.8
Potato manurial trials. Results for 1940-41.
J. Dep Agric. Vict., 1942, 40: 75-85.

The results of potato manurial trials carried out in 11 localities in Victoria, Australia, are briefly recorded for the past season together with the average results over a varying number of years. The tables for average results show manures used per acre, the average yield per acre, the increase due to manure, value of increase, cost of manure and extra return per acre due to manure. Miscellaneous trials at the main experimental plots at Millbrook provided the following information. Dipping the seed in formalin 1 lb. to 20 gal. water before planting gives on the average a 67% increase over untreated seed. The storage of seed in specially constructed trays exposed to light has given over 14 years an average of 74% increase over seed stored in bags. Inter-row cultivation has over a period of 15 years resulted in an increase of 17 cwt. per acre after the first cultivation (3 per season). Immature seed has consistently given an average of one ton per acre better yield than ripe seed, possibly because seed harvested when immature has not yet received late season virus infections. Rigorous field selection of their own seed by growers is advocated. Seed purchased at random from a grower not practising selection was 88% virus infected. Seed selected at Millbrook over 5 years had only 2% virus infection and had a higher yielding capacity than certified seed obtained from another district.

928. WALLACE, T., CROXALL, H. E., AND PICKFORD, P. T. H. 631.8: 635.346 + 633.491
Manurial experiments on vegetable crops. II. Effects of farmyard manure and other manurial treatments on savoys and early potatoes.
A.R. Long Ashton agric. hort. Res. Stat. for 1941, 1942, pp. 33-8, bibl. 1.

For the savoy crop the great importance of abundant nitrogen was again shown. Farmyard manure and a town refuse product gave poor results due to their inability to supply sufficient nitrogen. In the potato experiment the low nitrogen status of plants resulting from treatments with farmyard manure and town refuse was again evident, but the effects on yield were not so serious as in the case of the savoys. Where potash salts were used as the source of potash in a complete fertiliser high yields were obtained with both crops. Magnesium deficiency symptoms developed in the foliage of the potato crop during the later stages of growth on all plots with the exception of those receiving magnesium sulphate and potash salts respectively. It cannot be stated at the present stage, however, that control was entirely due to these treatments owing to differences in the previous treatments given, particularly in respect of potash. The incidence of magnesium deficiency in relation to four treatments was correlated with the magnesium contents of haulm samples from the respective treatments. [From authors' summary.]

929. WALLACE, T., JONES, J. O., AND PLANT, W. 631.8: 633.491: 581.192
 Note on the composition of potato haulm from manurial treatments D, E, F, H.*
A.R. Long Ashton agric. hort. Res. Stat. for 1941, 1942, p. 39.
 Notes on Mg, K and Cl content.

930. IVERSON, V. E., AND HARRINGTON, F. M. 633.491-2.3
 Accuracy of the ultraviolet-light method for selecting ring rot free potato stocks.
Amer. Potato J., 1942, 19: 71-4, bibl. 4.
 The ultra-violet light method of selecting potatoes free from bacterial ring rot, developed recently at the Montana Agricultural Experiment Station, is shown to be as effective as the gram stain method, to be over ten times as quick, and to reduce the incidence of other "vascular" diseases.

931. MARSH, R. W., AND MARTIN, H. 633.491-2.411
 Simplified methods of potato blight control.
 Progress report III.†
A.R. Long Ashton agric. hort. Res. Stat. for 1941, 1942, pp. 79-82, bibl. 2.
 A continuation of tests shows that sprinkling from a watering can can be just as efficient as spraying in retarding the spread of potato blight (*Phytophthora infestans*). Three proprietary substances, Perenox, Soltosan and Coppersan, and bordeaux mixture proved equally good.

932. NATTRASS, R. M. 633.491-2.411
 Potato blight.
E. Afr. agric. J., 1942, 7: 196-201, bibl. 1.
 An account of potato blight, *Phytophthora infestans*, with special reference to Kenya. The disease does not seem to have been recognized in East Africa before 1941 though severe outbreaks occurred in S. Africa in 1909. Control measures are described and formulae given for bordeaux and burgundy mixtures.

933. BEAUMONT, A., AND LARGE, E. C. 633.491-2.95
 Potato spraying in the south-west. Lessons from 1941.
Agriculture, 1942, 48: 235-40.
 The results of spraying trials carried out on farms in Devon and Cornwall by the Seale-Hayne Agricultural College are reported. Timing was found to be important, spraying being effective up to the time that there were only 2 or 3 blight spots per plant, while a delay of even two days after this stage, when there would be, say, 12 spots per plant, would lead to failure. Freshly made bordeaux compounded from granulated copper sulphate crystals and fresh hydrated lime gave the best results of the several sprays tested. Proprietary sprays were a good second and dusts practically useless. Various spraying machines and costs including those of contract spraying are discussed.

934. MILES, H. W., AND MILES, M. 633.491-2.651
 Investigations on potato root eelworm, *Heterodera rostochiensis* Wollenweber, on the cyst population of a field over a series of years.
Ann. appl. Biol., 1942, 29: 109-14, bibl. 7.
 An interval of 7 years between potato crops was associated with the disappearance of all signs of potato sickness, usually connected with potato root eelworm infestation, in the two subsequent crops. The investigations afford further evidence that in the field factors other than potato root eelworm play a decisive part in the incidence of potato sickness.

935. McDONALD, W. J. B. 633.52
 Flax production in Victoria.
J. Dep. Agric. Vict., 1942, 40: 217-21.
 The most suitable soils for flax are fertile loams or clay loams. Flax does not follow potatoes very successfully because the soil after their digging is not sufficiently compacted before sowing. It cannot compete with vigorous weeds in the field and their presence in the cut sheaf seriously depreciates the value of the crop. Thus flax must not be planted on land known to produce a heavy crop of weed in spring or early summer. The production of a firm shallow seed bed with a rather fine soil, covering, though not fine enough to crust over after rain, will more than repay the trouble taken. Shallow seedling just under the surface is more profitable than deep seedling. Rolling before sowing is safer than rolling after sowing. The crop, however, will be benefited by rolling when 4-6 in. high, the work to be done in the afternoon when the plant is tough and pliable. Weeds may be kept down by grazing sheep. They will avoid the flax unless really hungry, but must be closely watched. Flax is not a soil exhausting crop but develops wilt if grown on the same land more than two successive years. A four-year rotation is advised.

936. ÜLBRICHT, H. 633.52-1.83
 Weitere über gunstige Kaliwirkung bei Flachs.
Ernähr. Pfl., 1941, 37: 65-6.
 The addition of potash to other manures increases the length of the stem in flax and makes for stronger fibres.

937. DEXTER, S. T. 577.15.04 : 633.63
 Preliminary findings on the use of plant hormones as seed treatment for sugar beets.
Quart. Bull. Mich. agric. Exp. Stat., 1942, 24: 245-8.
 In experiments here described none of the hormone treatments applied to the seed of sugar beets had any beneficial results.

938. WARD, G. M. 633.71: 581.1
 Physiological studies with the tobacco plant.
Publ. Canad. Dep. Agric. 729 (Tech. Bull. 37), 1942, pp. 100, bibl.
 The studies are grouped under two heads, namely Mineral investigations and Carbohydrate investigations, and are discussed in 5 papers and an appendix tabulating analytical results.

939. McEVoy, E. T. 633.71: 577.15.04
 Responses of tobacco seedlings to chemical growth substances.
Sci. Agric., 1942, 22: 528-32, bibl. 2.
 Treatment of tobacco seedlings or seed by watering with dilute solutions of indole-3-acetic acid (1) 10 days after sowing, (2) at 3 day intervals, (3) dusted on the seed with red copper oxide as a carrier, in each case resulted in significant increases in growth as measured by length of hypocotyl and dry weight. The addition of heteroauxin at 3 day intervals at the rate of 250 c.c. aqueous solution per sq. ft. at a concentration of 2.5 p.p.m., the initial application made just subsequent to planting, proved to be the most advantageous method for reasons which are given.

940. HILL, A. V. 633.71-2.8
 Yellow dwarf of tobacco in Australia. II.*
 Transmission by the jassid *Thamnoletix argentata* Evans.
J. Coun. sci. industr. Res. Aust., 1941, 14: 181-6.
 HILL, A. V., AND ALLEN, F. E.
 III. Occurrence and effect of agronomic practices.
Ibidem, 1942, 15: 13-25, bibl. 8.
 During a period of 5 years of study of the yellow dwarf virus disease of tobacco observations were made on the

* Used in article referred to in previous abstract.
 † For I and II see *Ibidem* for 1940, pp. 63 and 76. *H.A.*, 11 : 799.

* Part I. Big bud of tobacco, *Ibidem*, 1938, 10 : 228-30. *H.A.*, 8 : 153.

effect of a number of factors, including variety and source of seed, seedbed and seedling treatment, soils and fertilizers and on incidence of the disease, but none appeared to be of importance. Dry hot conditions during and immediately following the transplanting period favour the spread of the disease and the early appearance of symptoms, though infection may take place at any stage of growth.

941. FORD, J. S., FLETCHER, L., AND MANSON, T. 633.79-1.523

Brewing trials with new varieties of hops: 1941 growth.

J. Inst. Brewing, 1942, 48: 136-7.

The hops concerned were raised by Prof. E. S. Salmon at Wye College and grown at various places. Many of these new varieties are fully equal to and often better than the imported hops in content and character, preservative and otherwise, of the resins, yet it is practically impossible to get them taken up. The reasons for this boycott, most of which appear to spring from inherent dislike of change, are discussed. It is pointed out that mere physical examination of hops is insufficient to assess their real brewing value. Notes are given on the varieties tested.

942. SEN, B., AND CHAKRAVARTI, S. C.

581.143.26.03: 633.844

Studies in vernalization of mustard (*Brassica juncea*).

Indian J. agric. Sci., 1942, 12: 1-34, bibl. 18.

A full account of trials noted in *Nature*, 1942, 149: 139-40; *H.A.*, 12: 483.

943. PIETSCH, A. 633.85

Beitrag zur photographischen Darstellung, Farbbestimmung und Bedeutung der ölhaltigen Samen von Deutschland wachsenden Pflanzen. (The photographic reproduction, colour determination and importance of the oil seeds derived from plants grown in Germany.)

Landw. Jb., 1941, 91: 369-417, bibl. 28.

Illustrations are given of the seeds of more than 40 important cultivated and wild oil plants in Germany. The exact colours of the seeds are recorded according to Ostwald's chart [Die kleine Farbmesstafel, Göttingen and Berlin]. Notes of origin are given with regard to individual plants and the details of the seeds include shape, size, colour, weight, oil content and relative industrial importance.

944. SCHEIBE, A. 633.85

Die Oelrauke (*Eruga sativa* Lam.), eine für Deutschland neue Oelpflanze. (*Eruga sativa* [Tira, rocket salad or roquette—Bailey's Stand. *Cycl. Hort.*], an oil plant new to Germany.)

Landw. Jb., 1941, 91: 199-233, bibl. 25.

An account of preliminary trials on the cultivation of *Eruga sativa* for oil and fodder in Germany. Hitherto this plant has been specially cultivated for its oil only in small isolated regions of Transcaucasia, Persia and Afghanistan. It has also been grown in N.W. India and round Lahore. [Russian trials at Kiev were noted *H.A.*, 10: 1098.—Ed.] The trials here reported indicate its possibilities as a summer oil plant for Germany. It is thought it might well succeed on the lighter calcareous soils of N. and N.E. Germany where rape oil production becomes impossible. Seed should be sown in drills 20-25 cm. apart at the rate of 10-20 kg./ha. as early as possible in the spring. Trials suggest that given proper cultivation, yields of 3,200 kg. of seed per hectare might be expected, which would mean, after extraction, a production of 4.5 to 5.2 dz./ha. crude oil and 3.6 to 4.5 dz./ha. crude protein [or approx. 800-925 lb. crude oil and 640-800 lb. crude protein per acre]. The oil can be used, it is stated, for culinary purposes and for industry and the residue, after extraction, is a valuable fodder especially in the form of silage.

945. KNAPP, O. 633.85-1.52
Sonnenblumenzüchtung in Ungarn. (Sunflower breeding in Hungary.)

Züchter, 1940, 12: 193-9.

The first objective, in view of the variation in the available material, was the creation of a uniform type, next an increase in the yield quality of seed which leads indirectly to an increase in oil and protein content. These aims can be readily achieved by selection. Breeding for a one-flowered plant is desirable as such a plant produces a better yield and larger seeds. The possibility of selection on the basis of coloration of the hypocotyl is discussed, as is also the production of pest-resistant varieties.

946. HEEGER, E. F., AND BAUER, K. H. 633.859

Untersuchungen über den Morphingehalt der zum Handel zugelassenen und einiger anderer Mohnsorten und die Möglichkeit der Opiumgewinnung im Deutschen Reich. (Tests of morphine content of certain poppy varieties and the possibility of opium production in Germany.)

Landw. Jb., 1940, 90: 397-429, bibl. 97.

The authors consider in detail not only the work of others on the production of opium from the oil poppy (*Papaver somniferum*) but also their own recent experiments on the subject at Leipzig and Weissenstephan. The varieties which produce blue seeds are of higher value for opium production than the white seeded varieties. The white seeded varieties generally give the largest yields of opium but with the lowest content of morphine. Trials show that seed colour can be correlated with morphine content inside the different groups. Thus in groups with predominantly dark-seeded varieties those with silver-grey seeds have a very high morphine content, while those with darker, grey-blue seeds have a high morphine content. In crops with predominantly light coloured seeds those with white to ivory coloured seeds have medium morphine content and those with white seeds a low morphine content. Again a definite correlation is noticeable between shape of capsule and morphine content. Apart from these inherited characters morphine content varies greatly with climate, increasing in warm, dry summers and decreasing in wet seasons. The quality and quantity of opium can be improved by heavy manuring, especially nitrogenous, and by attention to time and method of collecting. Rough figures are given of the morphine content of opium produced in a number of different lands.

947. SCHARRER, K., AND SCHREIBER, R. 633.863.2-1.83

Über die Wirkung gesteigerter Kaligaben bei verschiedener Grunddüngung auf den Ertrag und die Qualität von Saflor (*Carthamus tinctorius* L.). (The effect of increasing the potash ratio in the manuring on yield and quality of safflower.)

Ernähr. Pfl., 1941, 37: 49-52, 61-4.

Pot experiments were made on safflower plants with four different basal manures, N1 P1, N2 P1, N1 P2 and N2 P2, to which were added increasing doses of potash, 1, 2 and 4 times K₂O. The single dose of N caused a light green coloration of the leaves, reduced branching of the inflorescence and gave relatively few capsules. The double dose of N produced a dark green colour, marked branching of the inflorescence and an increased number of capsules. The total yield was much increased by increased doses of potash. The weight of roots and leaves, capsules and seeds increased. Potash is shown to be of special importance for seed formation. Lime is essential to the growth of the safflower. It does best in a neutral or possibly weak alkaline reaction. Phosphate is of less importance.

948. MELVILLE, R. 633.88

Vegetable drugs of Britain and their exploitation in the war.

Endeavour, 1942, 1: 84-5.

The situation in regard to the supply of vegetable drugs native to or able to be grown in Britain is reviewed. War-

time restrictions on transport, material for building and fitting drying sheds and on fuel supply greatly increase the difficulties. An account of the steps taken to instruct collectors and of other details of organization has appeared in *Pharm. J.*, 1941, 146: 213. The Therapeutic Requirements Committee of Medical Research has issued a list of 26 drugs recommended for increased production in the United Kingdom, of which 15 are native.

949. POLLARD, A. 631.8: 635.13: 581.192
Note on the effect of manurial treatments on the carotene content of carrot roots.

A.R. Long Ashton agric. hort. Res. Stat. for 1941, 1942, p. 32.

Analyses of carrots grown in the manurial trials (see *H.A.*, 12: 959) indicate that the production of carotene by the root seems to depend on adequate nitrogen and is adversely affected by the presence of chloride.

950. WORMALL, H. 635.13: 632.48
Black rot of carrots.

Gdnrs' Chron., 1942, 111: 172.

Black rot of carrots, *Alternaria radicina*, is reported from a clamp of carrots in Kent. The disease causes serious wastage of carrots in transit and storage in U.S.A. and on the continent of Europe but its definite appearance in the United Kingdom has apparently not previously been published, though a suspected case was noted in 1934.* Carrots attacked by the fungus exhibit dark sunken areas of decay which penetrate deep into the root. Such roots should at once be burnt. To throw them on the compost heap would lead to contamination of the soil and possible infection of the next year's crop.

951. HANSON, A. J., AND WEBSTER, R. L. 635.13: 632.77
The carrot rust fly.

Bull. Wash. agric. Exp. Stat. 405, 1941, pp. 24, bibl. 9.

The larvae of the carrot rust fly (*Psila rosae*) feed on and injure the roots of carrots, parsnips and celery. Crude naphthalene flakes broadcast on the soil as a repellent afforded the only really satisfactory control in trials in Washington State in 1936 and 1937. Corrosive sublimate, calomel, bordeaux, bordeaux and oil, oil-cubé, derris and lead arsenate were ineffective.

952. LINN, M. B. 635.16: 632.4
Leaf-spot disease of cultivated salsify.

Phytopathology, 1942, 32: 150-7, bibl. 6.

An account is given of an apparently undescribed leaf spot of cultivated salsify, *Tragopogon porrifolius*, caused by a variety of *Stemphylium botryosum*.

953. STELZNER, G. 635.24
Entwicklungsphysiologische Untersuchung über die Schosshermung an Knollen von Topinambour (*Helianthus tuberosus*). (The cause of checked growth in Jerusalem artichokes.)

Pflanzenbau, 1941, 18: 150-7, bibl. 3.

Trials here briefly described show the necessity for exposing Jerusalem artichoke tubers to a certain amount of cold if removed from the ground during the winter. If they are not so submitted to cold, spring growth will be checked or absent. They need a three-week exposure to temperatures ranging from -2-0° C. to 8-4° C., the best growth being achieved after exposure to a temperature of 1-3° C. for 20 days.

954. HEATH, O. V. S. 635.25
The production of onion sets. A progress report, 1940-41.

Agriculture, 1942, 49: 59-60.

The following conclusions are drawn from work carried out by the Imperial College of Science and Technology on

* Salmon and Ware, J.S.E. agric. Coll., Wye. 1934, No. 33, p. 19.

physiological problems connected with the production and use of onion sets which began in 1940. Bolting in the second season was prevented by growing sets from seed at "high" temperatures (heated greenhouse). Methods for doing this under cloches are to be investigated. Bolting was reduced by the use of small sets produced by late sowing and crowding. Seedlings of Ailsa Craig and Bedfordshire Champion with more than one foliage leaf begin to form a bulb when the day length reaches 16 hours, May 25, and 15 hours, May 14, respectively, irrespective of temperature. High temperature does not seem to affect bulbing but produces earlier sets and better maturing and ripening. Very late sowing (early June) may at high temperatures produce extremely small sets; at lower temperatures the bulbs may fail to develop. Early May is the best time for sowing to produce sets. Yield of sets up to 4 tons per acre may be obtained with a seeding of 157 lb. per acre.

955. MOYSE, W. J. 635.25
How they grow onions in Bedfordshire.

Market Gr., 1942, 19: 25: 3-4.

An account of the methods employed in the Bedfordshire onion growing industry, including growth for seed. The industry has been in commercial existence over 200 years and crop failures are practically unknown.

956. BLACKMAN, G. E. 635.25: 632.51
The control of weeds in onions.

Ann. appl. Biol., 1942, 29: 204-5.

From a number of experiments carried out in 1941 it is concluded that for the most effective control of weeds in onions it is necessary to spray the seed bed with a 5% sulphuric acid (vol./vol. conc. of pure acid) solution at the rate of 120-160 gal./acre, or in the case of the tougher weeds a 7.5% concentration applied (i) just before the onion seedlings appear above ground, and (ii) once or possibly twice in the season during growth as soon as fresh weed seedlings appear. In a normal year 2-3 sprayings coupled with push hoeing should eliminate all hand weedings.

957. WELLS, S. P. 635.25: 632.954
Acid weeding of onions. A commercial exper-

iment.

Fruitgrower, 1942, 93: 279-80, 282.

Spraying a weedy spring onion crop with "constant oil of vitriol" [conc. sulphuric acid.—Ed.] S.G. 1.820, diluted to 1 in 50, destroyed the weeds and caused only superficial daishage to the onions, especially if these were sprayed with water the following day. Grass was not injured. The stages of trial and error by which the author, who is a commercial grower, finally achieved success are described in detail so that others may avoid the same rather costly mistakes, since scientific data appear to be lacking. The treatment saved the onion crop and a considerable sum which would have been vainly spent in weeding.

958. CHITWOOD, B. G., AND NEWHALL, A. G. 635.25: 632.651.3

The efficacy of certain nematicides in the control of onion bloat in muck soil.

Phytopathology, 1942, 32: 254-8, bibl. 6.

Autumn applications of chloropicrin at the rate of 2 c.c. in holes $9 \times 10\frac{1}{2}$ in. apart and a mixture of chloropicrin and ethylene chloride (1: 9) at the rate of 10 c.c. in holes $9 \times 10\frac{1}{2}$ in. apart both gave very highly significant reductions of onion bloat caused by the stem nematode *Ditylenchus dipsaci* in New York State. Probably ethylene chloride alone would be adequate, if used at a rate of 10 c.c. in holes $9 \times 10\frac{1}{2}$ in. apart, and would cost only 110 dollars per acre. Field applications of sulphur have given persistent reductions of crop weights sometimes with a carry over into the second season after application.

959. WALLACE, T., CROXALL, H. E., AND PICKFORD, P. T. H. 631.8: 635.346 + 635.13

Manorial experiments on vegetable crops. I. Effects of farmyard manure and of various fertilizer treatments on savoys and carrots.

A.R. Long Ashton agric. hort. Res. Stat. for 1941, 1942, pp. 25-31.

For the savoy crop nitrogen was of outstanding importance; phosphate omission also appeared to be deleterious; potash omission, in contrast to nitrogen omission, was associated with the highest yields. Farmyard manure was too low in nitrogen content for this crop. Salt and muriate of potash gave good yields and did not produce any harmful effects. The yields of carrots were abnormally high, probably due to seasonal influences. In contrast to the savoys, potash supply was of great importance and nitrogen omission of much less importance. Potash omission resulted in the lowest yields. Phosphate omission gave the highest yields and the requirements for phosphate would thus appear to be low for carrots on these plots. The nitrogen requirements of carrots in the field are probably low, as judged by the results for "omit nitrogen" and farmyard manure treatments, in both of which cases the tops indicated very low nitrogen conditions but good yields of roots were obtained. Both salt and muriate produced high yields. Splitting was very prevalent and appeared to be reduced in amount by low nitrogen conditions and to be increased by chlorides. [From authors' summary.]

960. ANON. 635.36
War-time food crops. Success with sprouts.

Market Gr., 1942, 20: 6: 4.

The secret of success in producing large, firm Brussels sprouts lies in generous manuring—30-60 tons per acre of farmyard manure or 2 tons per acre of prepared shoddy is not too much—and in well working, harrowing and heavily rolling the soil. To act as a check to too exuberant leafing a dressing of 2 cwt. of finely ground bone meal per acre should be added when harrowing. Early May planting is advised for September cropping and spacing should be not less than 30 inches and 3 ft. on strong soils. Closer planting means that bottom leaves yellow and fall, a sprout being lost with each dropped leaf.

961. SCHUPHAN, W. 635.36 + 635.347

Rosenkohl und Grünkohl im Hinblick auf ihren biologischen Wert. (Brussels sprouts and kale and their nutritive value.)

Vorratspflege u. Lebensmittelforsch., 1940, 3: 209-20 from abstract *Forschungsdienst*, 1942, Vol. 13, abstr. p. 8.

Both sprouts and kale are found to be an excellent source of protein and in that respect much superior to spinach and leeks. They contain a noticeable amount of sugar. Further the carotin content, while considerably lower than that of spinach and carrots, is quite high, this being especially the case in the loose leaves of the Brussels sprouts. The vitamin C content was on the low side in the analyses made, but this is attributed to excessive cold in 1940, i.e. -25°C .

962. WOODMAN, R. M. 635.41: 631.8

The nutrition of spinach.

Ann. appl. Biol., 1942, 29: 97-102, bibl. 5.

The effects of varying the supply of certain nutrients on Clucas's New Giant Leaved Spinach grown in sand culture are described. A reduction of the supply of nitrogen as sodium nitrate over the long range 65.92-24.72 p.p.m. of nitrogen did not lead to any reduction in the yield of foliage, and therefore nitrogen appears to be unnecessary for yield above a certain optimum amount; further reduction of the supply led to diminished yields. Deficiency in boron gave small plants on which buds and new leaves died. Potassium encouraged yield of foliage and its deficiency produced small plants, scorch and limpness and death of leaves. Reduction of phosphorus to 5.46 p.p.m. gave optimum yield of healthy foliage but further reduction decreased yield.

963. LORANT, M.

A new vegetable: celtuce.

Gdnrs' Chron., 1942, 111: 261.

635.52

A species of lettuce new to commerce is being raised by Messrs. Burpee, Fordhook Farms, Philadelphia, from seed acquired in 1938 from the China-Tibet border. It produces a long, stout, central stalk which together with the tender apical leaves may be eaten raw or cooked, the outer skin of the stalk being first removed. The flavour is reminiscent of celery but more delicate. It is widely used in its native locality.

964. OGILVIE, L., AND CROXALL, H. E. 635.52: 632.4

Observations on downy mildew and grey mould on glasshouse lettuces.

A.R. Long Ashton agric. hort. Res. Stat. for 1941, 1942, pp. 76-8.

The removal of lower leaves and the dipping of affected seedlings in colloidal copper and sulphur before planting out allowed the plants to grow away from downy mildew (*Bremia lactucae*). Of the 4 varieties used Early French Frame showed less infection in grey mould (*Botrytis cinerea*) than 'Gotte à forcer', Cheshunt Early Giant, or Cheshunt Early Ball.

965. HIRSOV, M. D. 635.63: 581.143.26.03

Vernalisation of cucumbers. [Russian.]
Sady i Ogrody, 1941, No. 1, pp. 19-21.

Seeds of five cucumber varieties were the subject of experiment. Before vernalization all seeds were treated for two hours with 0.5% formalin and then dried to their original moisture content. To each 100 gms. of seed having 11% moisture 34 c.c. of water were added, thus bringing their moisture content up to 50-55% of dry weight. The seeds were next placed in a thermostat for periods of 1, 3, 5 and 10 days, temperature being maintained at 20°C ., and some samples for 1, 3 and 5 days at a temperature of 30°C . The experiments were so arranged that in all instances vernalization ended on 29 April, the day appointed for sowing on plots. On the average both germination and flowering took place 2 or 3 days, and with some varieties 5 to 6 days earlier than in the control. Earliest flowering and earliest fruiting of the varieties were brought about by different periods of vernalization at the different temperatures. Later, the differences between treated and untreated varieties disappeared and the first gathering of fruit from both could be undertaken simultaneously. Thus it was proved that as regards vegetable crops the phases of bud-formation, flowering and start of fruit-bearing are not reliable indications of the earliest date of ripening of a variety. Even the date of the first harvest is insufficient for its determination. The best indication, one moreover that is of practical interest to the grower, is the yield-increases over a certain period of time. In accordance with this criterion, figures are given which show that the fruit-bearing of the five varieties treated was consistently earlier than that of the controls. The results, as regards yields of the five varieties, according to different periods of vernalization are given in detail. The general conclusions reached are that the vernalization of seed at 20°C . for 3 to 5 days increases yields by 20 to 30% and in some instances as much as 50%, and that vernalization for 10 days lowers yields.

966. MCCLURE, T. T., AND ROBBINS, W. R.

635.63: 632.4

Resistance of cucumber seedlings to damping off as related to age, season of year and level of nitrogen nutrition.

Bot. Gaz., 1942, 103: 684-97, bibl. 25.

A low level of nitrogen nutrition, early age and the relatively poor lighting of winter were found to be associated with increased susceptibility of sand-cultured cucumber seedlings to damping off (*Pythium* sp.). Resistance to damping off was associated with the formation of lignin in the plant cells. It appeared to act as a barrier to the spread of the fungus in

the tissues. Lignification arose only in response to a wound or fungus infection, and was absent from healthy seedlings from badly infected plants. It is aided by an adequate nitrogen supply and long photoperiods of high light intensity. The reasons why lignin, a carbohydrate derivative, should be aided in its formation by an adequate nitrogen supply are discussed.

967. NELSON, R. C. 635.53-2.19: 546.27
Boron deficiency in Minnesota-grown celery.

Minn. Hort., 1942, 70: 43.

On peat soil applications of borax at the rate of 50-60 lb. per acre completely relieved boron deficiency in celery in Minnesota. Smaller applications were proportionally less effective.

968. MAHER, F. A. 635.64
Tatura Dwarf Globe. A new tomato suitable for market and canning.
J. Dep. Agric. Vict., 1942, 40: 241-4.

The characteristics of a new dwarf tomato released by the Horticultural Research Station, Tatura, Victoria, Australia, under the name Tatura Dwarf Globe are described. It is claimed to be well ahead of the existing dwarf varieties as a canning and market type.

969. BONNER, J. 635.64: 577.16
Transport of thiamin in the tomato plant.
Amer. J. Bot., 1942, 29: 136-42, bibl. 3.

In the vegetative tomato plant there is a thiamin gradient from above downwards with the highest concentration in the youngest leaves. Thiamin is produced in mature leaves and it accumulates in other actively growing parts of the plant, principally in portions of the plant toward which a transport of other materials such as carbohydrates would be expected. Comparative thiamin accumulation in girdled petioles of leaves of different ages indicates that thiamin may be exported by mature leaves having relatively low concentrations rather than by young leaves having higher concentrations of the substance.

970. SYCENKO, F. Z. 635.64: 581.143.26.03
Vernalising tomato seeds. [Russian.]
Sady i Ogorod, 1941, No. 2, pp. 15-6.

Experiments in vernalizing tomato seeds were carried out in 1937 and in 1939 in the Ordjonikidze territory. In 1937 the process lasted for 7 days of 24 hours each and in 1939 for 15 days. The method of vernalization was as follows:—seed contained in clean canvas bags was soaked in water at 18° to 20° C. for 20 hours, then left to drain. Sawdust, which in the meantime had been sterilized at 100° C., was wetted and mixed in the proportion of 2 parts to every 1 of seed and was spread, in a layer 1.5 to 2 cm. deep, over wet canvas. It was prevented from drying out by the occasional addition of water, which maintained it at constant weight and was kept at a temperature of 18° to 22° C. during the day and 12° to 15° C. at night. Vernalized and control seeds were sown at the same time, the former germinating, in one experiment, 6 days and, in the other, 11 days earlier than the latter. Both also were planted out at the same time into ground prepared for irrigation. The plants from vernalized seed were the better developed and continued to be so in several respects; they flowered 17 and ripened 10 to 12 days earlier, their yield was 20 to 25% larger. From the plants grown from vernalized seed the average number of fruits per plant and the average weight of a single fruit were larger than those from plants grown from unvernalized seed.

971. ERMOLAEVA, N. I. 635.64: 631.541.11: 633.491
An experiment in vegetative hybridization in order to obtain economically valuable types of tomato.
[Russian.]

Vernalisation, 1941, No. 2 (35), pp. 31-4.

Studies were made of the seedling progenies of a number of varieties and hybrids of tomato grafted on wild species of

Solanum, including *S. demissum*, *S. acaule* and *S. nigrum*. Some progenies showed an improvement in such characters as size of fruit, yield of fruit per plant and proportion of fruits maturing. Others gave a decrease, but it was found that those families which gave the best results out of doors often gave the worst in the greenhouse and vice versa. Many of the progenies gave a higher percentage of mature fruits, showing that a reduction in heat requirement had been effected.

972. "ALERT." 635.64
New method of strawing tomatoes.
Market Gr., 1942, 20: 2: 2.

An inverted V shaped trench is taken out between the rows of tomato plants (under glass). The V is covered with a layer of straw and 2 or 3 inches of top are left showing after filling in with soil. When water is needed it is poured down the ends of the straw and goes right to the deeper roots which with ordinary piping are often left unwatered and still dry.

973. CLENDENNING, K. A. 635.64: 631.547.6
The respiratory and ripening behaviour of the tomato fruit on the plant.
Canad. J. Res., 1942, 20, Sec. C, pp. 197-203, bibl. 9.

The investigations are concerned with the respiratory behaviour of attached tomato fruit in relation to season and light intensity during growth and were carried out at Guelph and Toronto on plants in the greenhouse, in the open and in a cloth house bed shaded to 50% intensity. Soil conditions were made as comparable as possible. Growth was found to be associated with an absolute increase in respiration rate. Fruits of all populations at different seasons of the year and under different light conditions during summer all showed a marked rise in respiration to the yellow orange stage and thereafter a decline as the fruit ripened to full red. Fruit in cloth houses, though following this rule, showed a consistently lower rate of respiration. It is also shown that the area of free gaseous diffusion in the attached tomato plant is localized at the stem end as it is in unwaxed fruit in storage. In the attached fruit the unobstructed part of gaseous exchange is through that part of the fruit ordinarily covered by the calyx or through the immediately adjacent parts of the receptacle and pedicel. Experimental obstruction of gaseous exchange produces symptoms resembling those of blotchy ripening and leather end. The possibility of unusual local tensions of oxygen and carbon dioxide in the fruit flesh contributing to the appearance of these disorders is worth investigation.

974. LYON, C. B., BEESON, K. C., AND BARRENTINE, M. 635.64: 631.8
Macro-element of the tomato plant as correlated with fruitfulness and occurrence of blossom-end rot.
Bot. Gaz., 1942, 103: 651-67, bibl. 25.

The effects of 87 different nutrient solutions varying in the relative proportions of macro-nutrient elements were studied in the case of 1,044 plants of an inbred strain of Bonny Best tomato in relation to fruitfulness and the occurrence of blossom end rot. The greatest differences in fruitfulness over wider ranges of concentration resulted from variations in amounts of calcium and nitrate in the nutrient solutions. The nutrient composition optimum for fruitfulness may not, however, be optimum for height of plant and fresh and dry weight of root system. Greatest fruitfulness occurred in treatments relatively high in nitrate and low in sulphate and phosphate in the anion triangle and in treatments relatively high in calcium and low in magnesium and potassium in the cation triangle. The occurrence of blossom end rot was clearly correlated with calcium nutrition. No correlation was observed with any other macro-element.

VEGETABLES, DRUGS, STIMULANTS, ETC.

975. HORSFALL, J. G., AND HEUBERGER, J. W. 635.64: 632.48
Measuring magnitude of a defoliation disease of tomatoes.
Phytopathology, 1942, 32: 226-32, bibl. 6.
 The McKinney rapid index-infection technique, here described, was found to be both rapid and precise in measuring the magnitude of infection when applied to tomato defoliation by *Alternaria solani* in U.S.A.

976. BREMER, H. 635.64-2.19
Das Blattrollen der Tomaten. (Leaf roll in tomato.)
Phytopath. Z., 1941, 13: 445-80.
 Three forms of leaf roll in tomato are distinguished. They are all considered to be pathological symptoms rather than actual diseases. The symptoms appear to be due to a pathological piling up of organic substance in the leaves. A number of tomato varieties are classified into three groups, namely, varieties which are immune or susceptible to leaf-roll and intermediate varieties.

977. YOUNG, P. A. 635.64: 632.19
Varietal resistance to blossom-end rot in tomatoes.
Phytopathology, 1942, 32: 214-20, bibl. 9.
 Marglobe and Pritchard are the commercial varieties strongly resistant to physiological blossom-end rot in tomatoes in Texas. A list is given of other varieties showing considerable resistance and of some extremely susceptible. *Fusarium* wilt had no apparent effect on the resistance of tomatoes to blossom-end rot. Practical control in areas without irrigation consists in cultivation so as to ensure the most favourable water supply available and takes the form of shallow cultivation every 7-10 days to control weeds, to delay (presumably) evaporation from wet soil and to make the plants depend on deep roots.

978. KEARNS, H. G. H. 635.64: 632.95
A method of spraying outdoor tomatoes.
A.R. Long Ashton agric. hort. Res. Stat. for 1941, 1942, pp. 70-1.
 The technique of spraying copper oxychloride and cuprous oxide washes for the control of potato blight (*Phytophthora infestans*) on outdoor tomatoes.

979. BAUMEISTER, W. 546.27: 635.65: 581.192
 Untersuchungen über den Einfluss des Bors auf den Stickstoffgehalt von *Phaseolus vulgaris*. (The effect of boron on the nitrogen content of the bean.)
Phytopath. Z., 1941, 13: 481-504.
 Experiments on the effect of boron on the growth of *P. vulgaris* indicated that boron was essential to the plant. The exact role played by boron in the metabolism of the plant is still in doubt, but, in discussing the theory of Schropp, the author comes to the conclusion that the excessive swelling caused by lack of boron is not the cause but rather the visible effect of some unknown primary action of boron on the condition of the plasmic colloids.

980. ZAUMAYER, W. J. 635.656: 632.4
Reaction of pea varieties to *Septoria pisi*.
Phytopathology, 1942, 32: 64-70.
 Of the 134 varieties and strains of peas tested under field conditions for resistance and susceptibility to *Septoria pisi* only two, one being a very poor type from Puerto Rico, exhibited a very high degree of tolerance. The other was a Perfection strain of canning pea. Early varieties were more susceptible than later ones.

981. STUBBS, L. L. 635.656: 632.4
Ascochyta blight of field and garden peas.
J. Dep. Agric. Vict., 1942, 40: 260-2, bibl. 3.
 In this instance the term Ascochyta blight of pea is applied solely to the disease caused by *Mycosphaerella pinodes*,

982. KLIGMAN, A. M. 635.8
Secondary spores in the mycelium of the cultivated mushroom, *Psalliota campestris* Fr.
Amer. J. Bot., 1942, 29: 304-8, bibl. 11.
 HEINHOLD, J., NOLL, J., AND HAUSRATH, E. 631.462
 Über die Ursachen für Misserfolge des Dämpfens schwerer Böden. (Reasons for failure in steam treatment of heavy soil.)
Gartenbauwiss., 1941, 15: 471-86.
 LECLERG, E. L. 633.491-1.521: 519
 Relation of field plot design to seed-source tests of Irish potatoes in the south.
Amer. Potato J., 1942, 19: 75-9.
 SIMPSON, G. W. 633.491-2.8-2.753
 Aphids and their relation to the field transmission of potato virus diseases in Northeastern Maine.
Bull. Me agric. Exp. Stat. 403, 1940, pp. 189-305, bibl. 44.
 FOLSOM, D. 633.491-2.8
 Results of testing some laboratory methods for possible use in the detection of virus diseases in potato tubers.
Bull. Me agric. Exp. Stat. 407, 1941, pp. 83-104, bibl. 21.
 RAWLINS, W. A. 633.491-2.7
Current contributions on potato insects.
Amer. Potato J., 1942, 19: 42-7, bibl. 36.
 Confined to American literature of 1940-41.
 BAYLIS, G. T. S. 633.52-2.4
 Stem-break and browning (*Polyspora lini*) of flax in New Zealand.
N.Z. J. Sci. Tech., 1941, 23: 1A-8A, bibl. 13.
 GRIZZARD, A. L., DAVIES, H. R., AND KANGAS, L. R. 633.71-1.8
 The time and rate of nutrient absorption by flue-cured tobacco.
J. Amer. Soc. Agron., 1942, 34: 327-39, bibl. 12.
 HORTON, H. A. 633.71-1.417
 The relation of soil organic matter to the production of flue cured tobacco.
Sci. Agric., 1942, 22: 546-51, bibl. 7.
 BERKELEY, G. H. 633.71-2.8
Tobacco mosaic in Ontario and Quebec.
Sci. Agric., 1942, 22: 465-78, bibl. 5.
 PHILLIPS, J. H. H. 633.71-2.8
 Three strains of cucumber mosaic occurring on tobacco in Ontario and Quebec.
Canad. J. Res., 1942, 20, Sec. C, pp. 329-35, bibl. 11.
 GLASSTONE, V. F. C. 633.71-2.8
 Study of respiration in healthy and mosaic-infected tobacco plants.
Plant Physiol., 1942, 17: 267-77, bibl. 21.
 CHAMBERLIN, F. S., AND MADDEN, A. H. 633.71-2.6/7
Insect pests of cigar-type tobaccos in the southern districts.
Circ. U.S. Dep. Agric. 639, 1942, pp. 54.
 FORD, J. S. 633.79: 663.4
 Brewing trials with new varieties of hops raised by Prof. E. S. Salmon at Wye College, Kent, 1940 crops.
J. Inst. Brewing, 1941, 47: 146-8.
 BODE, H. R. 633.822-1.811.9
 Über den Einfluss von Spurenelementen auf das Wachstum der Pfefferminze (*Mentha piperita* L.). (The effect of trace elements on the growth of peppermint.)
Gartenbauwiss., 1940, 11: 654-64.

D'OLIVEIRA, M. DE L. 633.842-2.8
 Dois virus no pimenteiro. (Two virus diseases of pepper (*Capsicum annuum*) [namely tobacco and cucumber mosaic].)
Agron. lusit., 1940, 2: 209-24, bibl. 15.
 Phenomena and possible control measures.

LEHR, J. J. 635.11: 631.811.9
 The importance of sodium for plant nutrition.
 III. The equilibrium of cations in the beet.
Soil Sci., 1942, 53: 399-411, bibl. 3.

COOK, W. C. 632.754: 633.63
 The beet leafhopper.
 Bionomics and control of *Eutettix tenellus*.
Fmnrs' Bull. U.S. Dep. Agric. 1886, 1942, pp. 21.

BAKER, F. T., and others. 635.13: 632.77
 Observations on the biology of the carrot fly (*Psila rosae* Fab.): assembling and oviposition.
Ann. appl. Biol., 1942, 29: 115-25, bibl. 1.

WALTON, C. L. 635.34: 632.78
 Cabbage caterpillars [and their control].
Agriculture, 1942, 48: 243-6, bibl. 4.

ING, E. G. 635.64
 Outdoor tomato growing in war time.
Agriculture, 1942, 48: 240-3.
 In England.

FLOWER GROWING

983. ROBERTS, J., AND WADSWORTH, S. E. 631.544: 631.588.1

The all-electric greenhouse.

Bull. Wash. agric. Exp. Stat. 404, 1941, pp. 22.

How to construct a small electrically heated and ventilated greenhouse together with suggestions for the most suitable flowering plants to grow in it.

984. SMITH, F. F., AND WEISS, F. 635.939.124: 632.4

Relationship of insects to the spread of azalea flower spot [*Ovulinia azaleae*].
Tech. Bull. U.S. Dep. Agric. 798, 1942, pp. 43, bibl. 4, 10 cents.

Insects do not appear to be primarily responsible for the development of this disease of azaleas, when once it has got established in a planting, though they may help to spread it to neighbouring plants. The control of the disease itself, therefore, remains essential.

985. CORNMAN, J. F. 635.976-632.111

The winter hardiness of some ornamental woody plants of New York State.

Bull. Cornell. agric. Exp. Stat. 772, 1941, pp. 32, bibl. 12.

Notes on the winter hardiness of nearly 200 ornamental woody plants, many of them well known in England, in five different climatic zones of New York State.

986. FERGUSON, W. 635.936.69: 632.19

Sleepiness in carnations.

Sci. Agric., 1942, 22: 509-18, bibl. 1.

Investigations indicate the presence of some factor in the shipping of carnations by rail which sometimes causes

KERSTEN, H., AND SMITH, G. F. 635.64: 581.144.2
 Failure of root tips of tomato seedlings germinated from X-rayed seeds to grow in vitro.
Plant Physiol., 1942, 17: 321-3, bibl. 8.
 Thus differing from normal root tips of tomato.

ROBBINS, W. J. 635.64: 581.144.2
 Specificity of pyridoxine for excised tomato roots.
Amer. J. Bot., 1942, 29: 241-5, bibl. 13.

COTTIER, K. 635.65
 Investigations concerning varieties of dwarf beans in New Zealand.
N.Z. J. Sci. Tech., 1941, 23: 12A-23A.

WOLFE, A. C., PARK, J. B., AND BURRELL, R. C. 635.655
 A study of the chemical composition of soybeans during maturation.
Plant Physiol., 1942, 17: 289-95, bibl. 18.

SOMERS, I. I., GILBERT, S. G., AND SHIVE, J. W. 635.655: 581.192
 The iron-manganese ratio in relation to the respiratory CO_2 and deficiency-toxicity symptoms in soybeans.
Plant Physiol., 1942, 17: 317-20, bibl. 3.

BOYES, J., AND BOND, G. 635.655: 631.847.2
 The effectiveness of certain strains of the soybean nodule organism when associated with different varieties of the host plant.
Ann. appl. Biol., 1942, 29: 103-8, bibl. 13.

FLOWER GROWING

sleepiness in the flowers. There are indications that this factor may be the presence of pintsch gas which is frequently used on the railways for lighting and cooking. This may leak slightly in the express cars used and at the gas outlets at the stations where the cars are charged. The escaped gas may penetrate to and affect the flowers, since one of its constituents is ethylene, and ethylene will definitely cause sleepiness.

987. WEISS, F., HAASIS, F. A., AND WILLIAMSON, C. E. 635.944: 632.952

Prestorage disinfection of narcissus bulbs.

Phytopathology, 1942, 32: 199-205, bibl. 8.

Of a number of fungicides tested ethyl mercury chloride and new Improved Cerenin (5% ethyl mercury phosphate) proved the most effective against basal rot when used in dilution as a two minute dip for narcissus bulbs, provided treatment was given within 2 weeks of lifting. On the other hand these treatments given so soon after digging may result in flower bud injury and the production of crippled flowers. A practicable compromise is foreshadowed in which the concentration of the chemical is reduced or the bulbs are dried artificially. Such experiments have been effective against rot and have produced no visible bulb injury, but flowering records are not yet available.

988. HALL, R. C. 632.76: 635.977

Control of the locust borer [*Cylleene robiniae*].

Circ. U.S. Dep. Agric. 626, 1942, pp. 19, 5 cents.

Pest of locust (*Robinia pseudacacia*) and other shade trees.

CITRUS AND SUB-TROPICALS.

989. SCHULTZ, E. F. 634.3(824.4)

Observaciones sobre la producción de frutas cítricas en Santiago del Estero. (Citrus industry in Santiago del Estero.)

Rev. industr. agric. Tucumán, 1941, 31: 299-302.

A review of the citrus growing industry in Santiago del Estero, Argentina. Most of the citrus in the State is grown

in small holdings of about 10 hectares. The fruit produced, especially mandarins, is early and of good quality. There is a tendency to too close planting and Bermuda grass is often troublesome and unchecked in the plantations. Little attention has been paid to selection, with consequent lack of uniformity. Nurseries are by no means blameless in propagating inferior types. Insect pests, especially scales,

are numerous. Sour orange and trifoliate are the chief stocks. The trees always look better on sour stock even in districts where theoretically trifoliate might be expected to prove more suitable. In summing up it is concluded that citriculture has a future in the region, though no one should undertake new plantations unless able to deal with them adequately by modern methods and that attention should concentrate more on early maturing types as likely to fetch the best prices.

990. MOUBRAY, J. W. 634.3

An interesting citrus farm in Rhodesia.
Calif. Citrogr., 1942, 27: 157, 181.

Emphasis is laid on the beneficial results to be obtained by the use of organic rather than chemical manures on citrus. The owner endeavours by the constant application of organic matter, in the form of litter from various animal and vegetable wastes to maintain the equivalent of a forest soil. The routine of the farm, whereby the necessary material is economically provided, is described.

991. HERRERO (EGAÑA), M., AND ACERETE (LAVILLA), A. 634.31

Variedades de naranjo. (Varieties of orange.)
Bol. Inst. nac. Invest. agron. Madrid, 1942, No. 6, pp. 125-31, bibl. 17.

The author gives a useful list of orange varieties (*Citrus sinensis* Osbeck) known to commerce, differentiating them according to commercial importance into three categories and noting the country where grown. Synonyms and a short list of authorities whose work can be consulted for further information on given varieties are also included.

992. ZORIN, F. M. 634.323: 575.25

The Sochi grapefruit obtained by the mentor method. [Russian.]

Vernalisation, 1941, No. 3 (36), p. 126.

Seedlings of Duncan grapefruit were badly damaged by frost. Some of the hardiest individuals were grafted on to *C. unshiu* growing on the roots of *Poncirus trifoliata*. The grafted seedlings became hardier each year and in 1939 bore excellent fruit. Cuttings from these grafts also proved quite hardy. The variety thus produced has been named Sochi grapefruit.

993. LAL SINGH, AND KHAN, A. A. 634.31: 581.175.11

Factors responsible for intensity of red colour in blooded oranges.

Punjab Fruit J., 1942, 6: 1121-3.

There is a very strong popular demand in the Punjab for blood oranges. These easily fetch three or four times the price of other Malta oranges. The value of the orange increases with the redness of the flesh. Oranges from blood orange trees, however, do not always exhibit the desired internal colour, a fact which leads to recriminations between buyers and sellers both of plants and fruit. The investigations reported here make it clear that fruit of poor quality and bad colour comes mainly from the side of the trees exposed to the hot afternoon sun. Shade provided on the sunny side greatly improved the fruit colour and quality though not bringing it up to the standard of the fruit on the less exposed side. The few fruits found in the heavily shaded interior of the tree developed no colour and were insipid. It is suggested that the leguminous shrub, *Sesbania aegyptiaca*, should be planted as shade on the south-eastern and south-western sides. It will last several years before having to be replaced. Occasional root cutting is desirable to prevent competition with the citrus.

994. HARDING, P. L., AND THOMAS, E. E.

634.323-1.541.11: 577.16

Relation of ascorbic acid concentration in juice of Florida grapefruit to variety, rootstock and position of fruit on the tree.

J. agric. Res., 1942, 64: 57-61, bibl. 6.

The ascorbic acid concentration was determined for 390 individual grapefruits picked from outside and inside branches of 5 trees each of Marsh grapefruit grown on rough lemon rootstock, of Marsh grapefruit grown on sour orange rootstock, and of Foster (pink) grapefruit grown on sour orange rootstock [taken at random from a commercial grove on Merritt Island, Fla.]. The results showed that Florida grapefruit from various sources has high anti-ascorbic properties. In this experiment the average ascorbic acid concentration was 0.40 milligram per milliliter of grapefruit juice. A relatively small but consistent difference was found in the ascorbic acid concentration in fruits obtained from outside and inside branches from the three sources; the outside fruit had the higher ascorbic acid concentration. This difference was found to be significant at the 1% level. The ascorbic acid concentration in fruits from the Marsh variety grown on rough lemon and on sour orange rootstocks was determined. A statistical study of these data showed a higher ascorbic acid content per milliliter of juice of fruit grown on rough lemon rootstock, but the difference was not significant. The ascorbic acid content of juice of fruits on the Marsh and Foster (pink) varieties of grapefruit, both of which were grown on sour orange rootstock, was also determined. The analysis of variance of these data indicates a higher ascorbic acid concentration in the Foster fruit. This difference was found to be highly significant ($P=0.01$). [Authors' summary.]

995. SOKOLSKAYA, V. P. 634.3: 581.163

Parthenocarpy as a result of pistil removal in flowers of citrus species. [Russian.]

Proc. Lenin Acad. agric. Sci. Moscow, 1940, Nos. 23-24, pp. 12-6.

Citrus flowers were subjected to various treatments as follows:—(1) pollination with foreign pollen, (2) self-pollination, (3) emasculation without pollination, (4) removal of the stigma, (5) removal of the style and (6) natural pollination. The largest set of fruit was obtained in the experiments with the styles removed; these fruits were all seedless and larger than the normal fruit. The method was therefore applied to 8 orange trees, 2 mandarins, 1 lemon and 1 grapefruit. All produced seedless fruit and in much larger quantity than the control trees open-pollinated. Thus the 3 experimental orange trees produced 443 more fruits than the 3 controls, and the 2 experimental mandarins 582 more than the controls. The seedless fruits were sweeter, less acid, more tender, contained more vitamin C and ripened earlier. The method is being recommended to the collective farmers and is thought to be of possible interest for other crops too.

996. TAYLOR, C. A. 634.3-1.67

Irrigation problems in citrus orchards.

Fmrs' Bull. U.S. Dep. Agric. 1876, 1941, pp. 34, 15 cents.

Observations are recorded on irrigation practices and yields in citrus orchards in Los Angeles and San Bernardino Counties, California, and comments are made on the very varied results achieved under different conditions of soil and cultivation methods. Improved methods are discussed under the following headings:—water and soil loss from deep, narrow furrows; wide, flat-bottomed furrows (greatly to be preferred to the deep narrow ones); distribution of water; care of young trees; cross-blocking furrows; irrigation with low-head sprinklers; alternate-middle irrigation. The many illustrations are very helpful.

997. SCHIPP, J. L. 634.3-1.541.44
Ideas on topworking.
Calif. Citrogr., 1942, 27: 168.
 The author claims improved results for the following method of topworking citrus. All the limbs are removed flush with the trunk except three of the most vertical, which are retained for budding, and one or more on the south or west side (in the northern hemisphere), which are kept temporarily as nurse branches. All cut limbs must be covered at the wound with a coating of beeswax and resin. Paint or oil that penetrates the wood causes dieback. The selected limbs are then budded, apparently with a good number of buds. In from 12 days to 6 weeks according to time of year and weather conditions the budded limbs are cut back to 6 inches above the highest placed bud. When sufficiently grown the buds are pinched back to 5 leaves and suckers are allowed to grow round them for protection during the first winter. The following spring the suckers are removed, the buds trimmed and the limb further shortened down to the top buds. The nurse limb is removed during the summer. Surplus buds are removed leaving enough to keep up the sap flow and as reserves in case some should still fail. The buds should be placed on the upper sides of the limbs, for those underneath break off easily, and fairly close to the crown. Buds placed far out on the limbs will be dwarfed and lack sucker protection. Budding may be done from April to July and again in September and October.

998. HAYWARD, H. E., AND BLAIR, W. M. 634.31-1.41
Some responses of Valencia orange seedlings to varying concentrations of chloride and hydrogen ions.
Amer. J. Bot., 1942, 29: 148-55, bibl. 15.
 The anatomical response of Valencia orange roots to high chloride concentrations and high pH values resembles that of the dormancy which alternates with activity in their normal growth cycle but may be accentuated or become permanent. Under low hydrogen ion concentrations few root hairs develop. High chloride or low hydrogen ion concentrations equally induce chlorosis and tip burn of leaves, the symptoms being increased when the two treatments are combined. High chloride reduces the frequency and length of root hairs. Both high chloride and high pH values inhibit growth, reducing the number of leaves and lateral roots. The experiments recorded were carried out on seedling plants in water cultures at the U.S. Regional Salinity Laboratory, Riverside, California.

999. BRYAN, O. C. 634.3-2.19
Deficiency symptom patterns in citrus.
 Reprinted from *Citrus Industry*, March 1938, pp. 5, bibl. 15.
 The symptoms caused in citrus by deficiencies of the following elements are recorded and illustrated:—N, P, K, Ca, Mg, Fe, Cu, Zi, Mn and B.

1000. HORTICULTURAL DIVISION AND CHEMIST'S BRANCH, VICTORIA, AUST. 634.3: 581.144.4
Excessive leaf-fall of citrus trees.
J. Dep. Agric. Vict., 1942, 40: 190-3, bibl. 5.
 The more important factors which have led to excessive leaf-fall of citrus in certain districts of Victoria are discussed. A dry summer with a light crop may deprive the leaves of the water they customarily draw temporarily from the fruit. This reduced supply contributes to the leaf-fall in the following early spring. Dry soil conditions also favour frost and salt injury. Salt may rise in the soil because of unsuitable irrigation methods (which may be unavoidable). Draining orchards which previously had a high water table forces the roots to remain near the surface; after such drainage the shallow roots are short of water and the deeper ones have not had time to form. The cure for most of these ills lies in light irrigations applied during winter, particularly by spraying. Failing spraying the flood and multi-furrow systems are practical. These should be timed with the aid of regular soil auger examinations. On light soils drainage with high water table will remove large quantities of salt (and nutrients, which must be replaced), while on heavy clay soils it is useless and the growing of a winter and summer cover crop is advised until the irrigation system in use has been improved.

1001. BENTON, R. J., AND LEVITT, E. C. 634.3-1.874
Green manuring [of citrus] in coastal districts.
Agric. Gaz. N.S.W., 1942, 53: 87-8.
 To get the best results with the smaller quantities of manure available owing to war conditions N.S.W. citrus growers are advised to grow a leguminous green manure, to use what phosphate is available to promote its growth and to apply the nitrogenous fertilizer direct to the trees when the green manure is turned in.

1002. CASS-SMITH, W. P., OWEN, R. C., AND HARVEY, H. L. 634.31-2.19
Water spot of navel oranges in relation to the application of white oil sprays and various other orchard practices.
J. Dep. Agric. W. Aust., 1941, 18: 267-84, bibl. 7.
 In the upper south-west of Western Australia, the chief centre for navel oranges, 80% of the total annual rainfall of 30 inches or more falls during the ripening and harvesting period. To secure good prices the oranges are held on the trees as long as possible and until recently without undue loss. Of late years fruit has rotted on the trees or dropped at maturity in increasing degree. Investigations show that the injured fruits were suffering from water spot, a physiological disease caused by imbibition of water by the rind. It was shown by experiment that water spot damage was three times greater where white oil had been sprayed on the trees than where no oil spray had been applied, though even on non-oiled trees the damage was not light. The effect of fertilizer treatments on water spot just failed to be significant, nevertheless the opinion is expressed that a correlation exists between the continued application of heavy fertilizer dressings rich in available nitrogen and the incidence of water spot. The growing of leguminous cover crops during winter should be encouraged as a partial substitute for these dressings. A storage experiment resulted in oranges from white oil-sprayed tree sectors showing greater susceptibility to mould wastage in storage than non-oiled fruit from the same trees. In a second experiment fruit was taken from trees unsprayed with white oil and was then waxed (slab cream) both with and without a fungicide (Shirlan A. G.). Half of it was wrapped in sulphite paper and half not so wrapped before packing in cases. The fruit held thus in common store kept its quality for 16 weeks, but deteriorated rapidly in the following 3 weeks. Wrapping did not entirely check mould.

1003. FAWCETT, H. S., AND KLOTZ, L. J. 634.3-2.411
Prevention of brown rot.
Calif. Citrogr., 1942, 27: 156.
 At planting citrus trees should be examined for brown rot gummosis or foot rot, *Phytophthora citrophthora* and *P. parasitica*, even if on resistant stock. If either gummosis canker or die-back of the roots are seen the tree should be discarded. Trees should be planted high enough for the first lateral roots to be just under the surface, that is as high or slightly higher than in the nursery. The position of the scion bud is no guide to planting depth. The contact of wet soil with the base of the tree for long periods should be avoided. The outside of the soil ball may be dusted with zinc-copper-lime dust 5-1-4 or the ball may be dipped for a moment in bordeaux mixture 2-2-100. In addition at planting equal parts of fine ground copper sulphate and hydrated lime may be mixed with water to form a paste or wash and applied with spray or brush to the first 8 inches

of trunk above the soil and down to the first lateral roots, the soil being scraped away for the purpose. When a smaller amount of copper salts is desired (e.g. on account of intended fumigation) the wash may be made with 5 parts finely powdered zinc, 1 part powdered copper sulphate, 4 parts hydrated lime. Application should be made just after planting and before the first irrigation and repeated before the second and third irrigations if necessary. When infection lower down the roots is probable a further treatment is advised. A weak bordeaux mixture 2-2-100 may be poured in or sprayed at the base of the young tree, pulling back for the purpose the burlap from the top of the ball.

1004. DEY, P. K. 634.3-2.3/4
Two common diseases of citrus trees in the United Provinces.

Bull. U.P. Dep. Agric., Fruit Ser., 7, 1942, pp. 5.

The diseases discussed are canker (*Pseudomonas citri*) and wither-tip (*Colletotrichum gloeosporioides*). Canker can be controlled by careful orchard hygiene and by spraying in April and July with bordeaux mixture. Sour oranges, pummelos and sweet oranges of Mediterranean origin are less susceptible than grapefruit. Control of wither-tip consists in cutting away all dried up twigs and picking off diseased leaves. The twigs should be cut clean a few inches below the dead portion and this pruning should be done thoroughly at regular intervals. A wash with bordeaux in late January can be given as a preventive measure. Excessive amounts of nitrogenous manuring tend to prolong succulent growth and so susceptibility, whereas potash manuring makes for greater firmness in the foliage and helps to ward off wither-tip.

1005. SOKOLOFF, V. P., AND KLOTZ, L. J. 634.3-2.752: 632.96

Mortality of the red scale on citrus through infection with a spore-forming bacterium.

Phytopathology, 1942, 32: 187-98, bibl. 7.

A denitrifying bacillus, unidentified with any of the known micro-organisms, is able, under laboratory conditions, to invade and destroy the adult red scale on lemons. Infection and death of the scale is accompanied by a significant decrease in soluble-nitrate content. It is possible that the lethal effect of the bacillus is related to the reduction of nitrate inside the insect. [Authors' summary.]

1006. EBELING, W. 634.3-2.752

Kerosene-rotenone spray. Some of the problems attending its use as a control for red scale.

Calif. Citrogr., 1942, 27: 188.

Rotenone incorporated in kerosene will greatly increase the effectiveness of the latter against red scale of citrus. Success depends on a thorough application and a high initial kill since kerosene leaves no residue to affect subsequent hatches. Results from first season's trials by the Riverside Station staff were very variable. Injury was caused in a number of cases by the kerosene flowing down the trunk and girdling or partly girdling it immediately beneath the soil line. Many trees were thus killed or damaged beyond repair. The kerosene does not evaporate rapidly below the soil surface and is in contact with the trunks for a long time. Trees 5-12 years old are the most susceptible from their habit of growth which directs the kerosene down the trunk to the soil. A method of prevention is to mound the base of the tree before spraying and to spread the mound immediately afterwards. Kerosene will also cause gumming in lemon trees up to 15 years, though with what degree of injury is not known. Such gum should not be removed. Experiments are in progress involving kerosene containing a solute which will greatly reduce the rate of penetration into the plant tissue. The discovery that finely ground derris or cubé root soaked in unheated kerosene for 30 minutes results in a higher concentration of extract in the kerosene than is contained in the standard toxic solution should result in a reduction of costs. The roots of derris and cubé

contain saponin which leads to a greater emulsification of the kerosene and increased wetting, with a reduced deposit of kerosene on the tree surface.

1007. FENNAH, R. G. 632.78: 634.31
The "orange moth" of Dominica, B.W.I.
Trop. Agriculture, Trin., 1942, 19: 73-8.

An Oletreuthid moth *Gymnandrosoma* sp. (probably new) has been occasionally causing small seasonal loss in Dominica by boring into developing orange fruit and thus affording entry for various fungi. The natural host was found to be the fruit of *Sinarubia amara*. The removal of these trees growing within 100 yards of the citrus plantations caused the infestation to cease. A life history of the insect is given. There is a Braconid parasite, *Brassus* sp. n.

1008. HERRERO (EGAÑA), M., AND ACERETE (LAVILLA), A. 631.4: 634.31
Datos acerca de los suelos de Carcagente. (Data on soils of Carcagente.) [English and French summaries, ½ p.]
Cuaderno Estac. Naranjera de Levante, Valencia, 7, 1941, pp. 24, bibl. 4.

The aim of the investigations was to correlate fruit characteristics of oranges with the soil types on which they are grown. The best quality fruit was found on sandy soil containing little lime but rich in available phosphoric acid. These lands, originally poor, had been transformed by irrigation. The land producing the poorest fruit was that nearest the river Jucar and contained a large proportion of river silt and often considerable clay, was slightly acid and poor in available phosphoric acid. The characters imparted to the oranges on various soil types (based on the Koebekey chart) are discussed and related to the physical and chemical properties of these soils. Carcagente was selected because of the great variety of oranges grown there and the contrasting soil types available. Presumably the results will be of general application.

1009. SOUTH AFRICA, UNION OF. 634.3: 382.6
Fruit production in the Union. Report No. 28.
The 1940 citrus export season.
Bull. S. Afr. Dep. Agric. 218 (Hort. Ser. 6), 1942, pp. 24, 3d.
Statistics without comment.

1010. AYLEN, D. 631.459
Gully control: some recent successes.
Rhod. agric. J., 1942, 39: 73-87.

The article describes and illustrates with numerous "before and after" photographs the very effective methods that can be adopted in controlling and reclaiming erosion gullies, some of great size. Attention is also drawn to mistakes commonly made in attempting this work.

1011. KOHNKE, —. 633.492-1.83
Starke Ertragssteigerungen bei Süßkartoffeln durch Kalidüngung in Schantung. (Greatly increased cropping in sweet potatoes as the result of potash manuring in Shantung.)
Ernähr. Pfl., 1941, 37: 77-8.

A brief note on the cultivation of sweet potato in China, showing the immense increase in yield produced by the addition of potash to the soil.

1012. SELL, H. M., AND OTHERS. 633.85: 577.15.04
Effect of chemical treatments in prolonging dormancy of tung buds.
Bot. Gaz., 1942, 103: 788-93, bibl. 10.

Injury to the flowers by late spring frosts seriously reduces the production of tung nuts in U.S.A. The results obtained in attempts to prolong the dormancy of tung buds by chemical treatments are described. The three treatments used consisted of:—(a) Direct injection of 0.01% aqueous solution of the potassium salt of α -naphthalene acetic acid into the bud scale sheath formed round the flower primordia of dormant buds. (b) Spraying the surface of the dormant

buds and twigs with 0.01% solution of α -naphthalene acetic acid, 4% dioxane and 1% fish-oil soap solution or with 0.4% by weight summer spray oil instead of the fish-oil soap solution. In other spray treatments the compounds of indole-3-acetic acid and α -naphthalene acetamide were substituted. (c) Application of the organic substance, namely, 0.3% solution of α -naphthalene acetamide or indole-3-acetic acid in lanolin by means of a small brush. Only (c) prolonged dormancy and for reasons not established, but the prolongation was described as "pronounced". The lanolin carrier was shown to be ineffective by itself.

1013. UNCHIEV, N. D. 634.58-1.67
The effect of irrigation and rain on yield and quality in *Arachis*. [Russian.]
Proc. Lenin Acad. agric. Sci. Moscow, 1941, No. 10, pp. 13-6.

The yield of groundnuts is directly related to rainfall which should be 800 to 850 mm. or even 1,000 mm. It is needed most in August and September when the dry matter in the seed is being accumulated most rapidly. Trials were made of growing groundnut in Azerbaijan with and without irrigation. Irrigation prolonged the period during which oil was stored in the seed and increased the rate of accumulation of dry matter and the quantity of oil in the seed. Total yield, proportion of well-developed seed, weight of individual seed and amount of oil increased with each additional irrigation. Irrigation had the result of making the higher trusses contribute a proportionately larger part of the crop than they do without irrigation. The increase in the weight of 100 seeds was due to increased fat content in the seed. The proportion of protein was lower but even so the total per hectare was greater than without irrigation. The acidity index was reduced by irrigation.

1014. PREST, R. L.

The avocado in Queensland.

Qd agric. J., 1941, 56: 450-72, bibl. 3.

A full account of the methods of growing the avocado with special reference to Queensland where the fruit is still commercially comparatively new. Propagation is considered in detail and is usefully illustrated. Large-scale field trials have been undertaken in several districts in conjunction with the Research Division of the Department of Agriculture and embrace rootstock trials, scion compatibilities and selection of commercially suitable varieties.

1015. WIEHE, A. 634.653-1.541
Le greffage de l'avocatier. (Grafting the avocado.)

Rev. agric. Maurice, 1942, 21: 63-8, bibl. 9.

A variety of veneer side grafting is recommended as the most suitable for the propagation of the avocado in Mauritius. A strip of bark and alburnum 10-15 cm. in length is removed from the base of the young stock or shoot to be grafted and a notch made at the lower end on which the base of the scion can rest. The basal end of the scion is prepared by a slanting cut to fit the cut surface of the stock. At the lower extremity of the scion a second short slanting cut is made in the reverse direction to fit the notch on the stock. The usual precautions are taken to ensure the junction of the cambium of stock and scion on at least one side. The tie is made with raffia, or preferably with wool as being more elastic, and is waxed together with the remainder of the scion. The temperature of the wax at time of application must not exceed 60° C. The top of the stock is cut back 2 or 3 months later. The author considers the method might be used to propagate most of the varieties of fruit trees in the island.

TROPICAL CROPS.

1016. DUGAND, A. 581.9(861)
On the vegetation and plant resources of Columbia.
Chron. bot., 1942, 7: 71-5, bibl. 10.

The vegetation of Colombia is divisible into 4 general vegetative "storeys" governed by the influence of mean temperature in relation to altitudes. The divisions are as follows: Megathermophytes from sea level to 4,000 ft.; macro-mesothermophytes with an upper boundary of 8,500 ft.; micro-mesothermophytes up to 11,500 ft.; microthermophytes up to 14,000 ft. The principle constituents of the flora at each altitude are mentioned. Throughout, the seasons show little temperature change and are marked by rainfall; the seasonal distribution, varying with the locality, is discussed. The agriculture, on which the country chiefly depends, is described. Exports consist of coffee, bananas, perillo-gum (*Manilkara* sp.), divi-divi pods (*Libidibia coriaria*) used in tanning, balsam (*Myroxylon balsamum*), nuts from ivory palms (*Phytelephas* spp.) used in button making, and Panama hats made from the fibre of *Carludovica palmata*. Tobacco exports to Europe have been much reduced on account of the war. Its geographical position makes it stand out as one of the most promising countries for agricultural development.

1017. POPENOE, W. 581.9(728.1)
Plant resources of Guatemala.
Chron. bot., 1942, 7: 16-9, bibl. 10.

Guatemalans commonly think of their country as divided naturally into 5 zones of vegetation. These are described with special reference to the form of agriculture obtaining in each. There is a brief historical survey of the agricultural progress in the country from pre-conquest times to the present day. The commercial future of a number of local and introduced plants is discussed.

1018. YUNCKER, T. G. 581.9(726.3)
The vegetation of Honduras, a brief review.
Chron. bot., 1942, 7: 26-7, bibl. 5.

Of botanical rather than agricultural interest. Much of the interior of Honduras is botanically unexplored.

1019. SCHERY, R. W. 581.9(862)
A few facts concerning the flora of Panama.
Chron. bot., 1942, 7: 77-9, bibl. 8.

The nature of the country is described and a brief outline is given of the more important plant genera inhabiting the six intergrading floristic regions which have been differentiated. A final flora should list 7,000-8,000 species. Botanical collections have been numerous. Many introduced economic plants, including coconut, mango, bread fruit, etc., have established themselves in regions which are now quite uninhabited. Many more tropical fruits and vegetables, as yet not available in quantity in the tropics, could be grown in Panama now, were proper agricultural methods followed.

1020. BOERGER, A. 581.9(899)
Recursos vegetales del Uruguay. (Plant resources of Uruguay.)
Chron. bot., 1942, 7: 27-9, bibl. 6.

The present agricultural situation in Uruguay is discussed, special reference being made to the work undertaken by the various agricultural and horticultural institutions, public and private.

1021. WILLIAMS, LL. 581.9(87).
Natural resources of Venezuela.
Chron. bot., 1942, 7: 75-7, bibl. 5.

The chief agricultural products of the country are coffee, which is classified by the altitude at which it is grown, cacao,

believed to be indigenous to Venezuela, corn, wheat, rice, beans in variety, tobacco, also considered to be indigenous and having several locally renowned varieties, cassava, sugar cane, cotton and bananas. During the last 5 years experiment stations have been established in certain districts for research on various crops. An account is given of the timber industry and of the large number of valuable woods, the full exploitation of which is hampered by inaccessibility and inadequate transport facilities.

1022. TEMPANY, H. A. 658.8: 551.566.1
Agricultural marketing in the Colonial Empire.

Reprinted from *Emp. J. exp. Agric.*, 1942, 10: 1-21.

A general survey of home and export marketing conditions in the colonial dependencies and mandated territories. Considerable development of organized marketing has occurred since 1920, but the position cannot be regarded as uniformly satisfactory.

1023. ANON. 581.144.2
Rootstudies.
Trop. Agriculture, Trin., 1942, 19: 41-2, bibl. 5.

Information acquired as a result of recent work by various investigators on growth and behaviour of roots is briefly reviewed with the object of stimulating further studies, particularly in warm countries. Trees from one country may not necessarily produce the same root system when grown in another, for instance *Azadirachta indica* (*Melia azadirachta*) when planted on the Gold Coast exchanges the strong non-branching taproot, which is characteristic in its native India, for a tangled mass of thick surface branch roots. It appears that all common exotic trees grown in West Africa develop a shallow root system. Thus a tree found suitable as a plantation shade tree in one country may by change of root habit prove unsuitable elsewhere. In West Africa the sorghum crop has to be allowed nearly 10 times the surface area to that customary in India. Doubtless a change in the root habit of the cultivated sorghums in these two regions is involved. In Mauritius a study of the root system has indicated what varieties of sugar canes are best adapted to particular situations and has clarified problems of cultivation and manuring.

1024. HARRISON, E. 631.459
Soil conservation work in Puerto Rico.

Trop. Agriculture, Trin., 1942, 19: 54-5.

A description of the work undertaken by the Soil Conservation Service, U.S.A.

1025. SCHARFF, J. W. 631.875
New health and prosperity from tropical soils.
Crown Colonist, 1942, 12: 385-6, bibl. 2.

An account of the system of composting village and town refuse in Malaya based on the Indore process. A diagram is given illustrating the layout of the Trengganu household composting plan which it is hoped to get widely adopted.

1026. KING, N. J. 631.874
New green manure crops.
Qd agric. J., 1941, 56: 486-8, reprinted from *Cane Grs' quart. Bull.*, July, 1941.

A preliminary report on 2 legumes of possible interest as green manures, namely, the "Giru" bean, a local plant at present unidentified, and *Dolichos biflorus* imported from South Africa, though listed as a native of Queensland.

1027. SCHOFIELD, J. L. 631.874: 551.566.1
Introduced legumes in North Queensland.
Qd agric. J., 1941, 56: 378-88, bibl. 11.

In trials under coastal conditions in North Queensland tropical legumes proved satisfactory but not temperate legumes. Information is given on a number of tropical varieties, all well known in cultivation. Their use for pasture, grassland renovation, green manuring and soil conservation is discussed.

1028. VAN DER VEEN.

632.732
Termieten in onze bergcultures. (Termites in Java.)

Bergcultures, 1942, 16: 74-6.

A short account of the 4 species of termite which in Java attack hevea, coffee plants and dry wood including 3-ply wood. They are *Coptotermes curvignathus* (hevea), *Microtermes insperatus* and *Macrotermes gilvus* (coffee) and the indigenous species *Cryptotermes buitenzorgii* (wood).

1029. IPPISCH, F., Jr. 632.951

Raiz de derris y otras plantas insecticidas útiles e importantes para su cultivo en Guatemala. (Derris and other insecticidal plants grown in Guatemala.)

Rev. agric. Guatemala, 1940, 17: 320-2, 18: 86-9.

The first derris plants to be grown in Guatemala were imported by air from the Philippines in 1940 by the Ministry of Agriculture. They were established successfully in the garden of the Laboratorio Quimico-Agricola. Plants are now to be distributed at cost price to intending planters. The article gives full instructions for their cultivation, preparation for market, etc., the instructions being based on common practice in countries where the crop is commercially grown.

1030. THOMAS, A. S. 633.523

The production of jute in Bengal.

Emp. J. exp. agric., 1942, 10: 96-102.

A description of the cultivation and conditions under which jute is grown in Bengal. The possibilities of jute-growing in other countries are discussed with special reference to Africa. Much of the poor growth experienced there is due to unsuitable soils. Friable, well drained soils rich in lime and potash are necessary.

1031. SCHULTZ, E. F. 633.523

El cultivo del yute en Tucumán. (Cultivation of jute in Tucumán.)

Rev. industr. agric. Tucumán, 1941, 31: 303-6, being *Circ. Estac. exp. agric. Tucumán* 104, 1941.

Attempts to establish jute growing in Tucuman have always failed, though the plant itself succeeds, owing to the cost of the fibre preparation process and the competition with India. At the present time, however, since jute is urgently needed in the Argentine and impossible to get, further attempts to grow it locally should be made. The circular describes the cultivation and retting. As regards the latter operation the author is a little apprehensive as to the effect on the peasantry of the devastating effluvium with which it will envelop the countryside, and since the rivers must be used he fears that neither cattle nor fish will altogether appreciate the robust solutions of rotting jute which will replace their drinking water for several weeks. Other difficulties lie in the transport of large quantities of the fibre, since adequate equipment is not possessed by the small farmers. It would, however, be worth while to make an effort to overcome these obstacles.

1032. MEDINA, J. C. 633.526.23

Nota preliminar sobre a reprodução sexual do sisal. (Preliminary note on the sexual reproduction of sisal.)

Rev. Agric. S. Paulo, 1942, 17: 41-50, bibl. 3.

At the Campinas Experiment Station, S. Paulo, poling *Agave sisalana* were induced to form flowers in addition to bulbils by the method of decapitating the pole about 6 feet from the ground, below its lateral branches. The portion remaining contains dormant buds which, following this treatment, will grow out and produce both flowers and bulbils. The fruit is described. Each capsule contained from 350 to 450 seeds of which only 6% were fertile. These could be easily distinguished. Various methods of assisting the germination of the fertile seeds were tried. Scarifying the seed coat gave 100% germination in a Petri dish, sowing the seed in common sterilized soil without treatment gave

95%. All the other methods, viz. treatment with sulphuric acid, darkness, 2 different cold treatments, one alternate cold and heat treatment and a period of 2 days' desiccation reduced or failed to improve on the soil germination percentage. Ninety plants were ultimately planted out. The parent plant had completely smooth-edged leaves while, without exception, those of the seedlings had marginal spines. However, the same phenomenon occurs in plants raised from bulbils of spineless parents. Otherwise the seedlings displayed great variety in character and formed a good basis for selection. Their rate of growth is only half that of plants from bulbils.

1033. CROSS, W. E. 633.61-1.543.3
La rapida multiplicacion de caña de las nuevas variedades. (Quick reproduction of new varieties of sugar cane.)

Circ. Estac. exp. agric. Tucumán 106, 1942, pp. 2.

A method of planting and treatment is described whereby 100 kg. of cane planting sections will provide 4,050 kg. of planting material at the end of the first season, 170,550 kg. at the end of the second and 7,180,250 kg. at the end of the third.

1034. GOODING, E. G. B. 633.61: 581.132
Some observations on the daily march of photosynthesis in the leaves of sugar cane.

Trop. Agriculture, Trin., 1942, 19: 45-7, bibl. 4.

Like coconut, coffee and cacao, sugar cane shows a marked decrease in assimilation rate during the midday period on bright days. The rate of maximum apparent assimilation is high, 10-12 mgm. CO₂/hour/sq. dm. leaf surface. [From author's summary.]

1035. LALLA, C. D. 633.682
An accidental discovery re cassava cultivation.

Proc. agric. Soc. Trin. Tob., 1942, 42: 63, 65, 67-9.

It has been thought worth while to reprint this paper which was originally read to the Society in 1930. The author states that by planting cassava cuttings in the form of pointed sticks 4-5 feet long in manured ground a very much heavier crop of superior quality tubers can be obtained than by planting the ordinary short cuttings. By pointing the end of these sticks it is only necessary to press them into the ground in order to plant them and the process can be carried out at times which enable planting during the dry season, the cause of much loss, to be avoided. On another occasion after the tubers had been removed from a crop grown in the ordinary way the entire bushes were stood against banana trees with a few shovels full of earth thrown over the roots. These were meant to supplement the supply of cuttings but it was found that in a few weeks' time they had grown a fresh crop of tubers which subsequently matured in about half the time required under the customary methods of planting short cuttings.

1036. GADD, C. H. 633.72-2.76
Observations on an attack by shot-hole borer on tea.

Tea Quart., 1941, 14: 132-46, bibl. 6.

Evidence is presented which indicates that the destruction of shot-hole borer beetles, *Xyleborus fornicatus*, of tea by natural causes is so great as to exceed any that could be brought about by parasites. No such parasite is known and to search for one would be waste of time.

1037. DE HAAN, I. 633.72: 581.192
De anatomische bouw van de theeplant. II.*
Bast en hout van tak en wortel. (The anatomy of the tea-plant. II. Bark and wood of branch and root.)

Arch. Theecult. Ned. Ind., 1941, 15: 213-34, bibl. 4.

This paper is the second of a series describing and discussing the anatomical structure of the tea plant.

* Part I. Anatomy of stem and leaf. *Ibidem*, 1939, 13: 318-43, noted *H.A.*, 10: 684.

1038. RAYNER, R. W. 633.73: 581.145.1
A progress report of investigations on flowering in coffee.

Mon. Bull. Coffee Bd. Kenya, 1942, 7: 42-4.

Two problems under consideration at the Scott Laboratories, Kenya, are (1) the stage during the growth cycle of coffee at which the flowering shoots are differentiated from those which will form lateral vegetative shoots, (2) the factors operating at this time and how they affect the chemistry of the coffee bush so as to stimulate flowerbud production. With this knowledge methods for producing a balanced ratio between leaf and crop, which is one of the basic desiderata for good coffee growing, could be devised. Such methods as are now in use are largely founded on empirical knowledge obtained from field experience and are by no means always successful.

1039. GELINCK, A. M. 633.73-1.542
Snoei van vruchtboomen en van de robusta in het bijzonder. (Pruning of fruit trees with special reference to robusta coffee.)

Bergcultures, 1942, 16: 106-14, bibl. 13.

Discusses the pruning of robusta coffee in Java. Some European theories of pruning fruit trees are explained for the sake of example and comparison. A number of reasons for pruning coffee are put forward. Mention is made of the first year's results in a pruning experiment with fan-grafted robusta TP 21. The total yield from 100 of these, unpruned, was 312 kg. The pruned trees, i.e. 4 frame branches retained, fan branches pruned and the trees topped at 1 metre, yielded 392 kg.

1040. BONDAR, G. 633.74
A cultura de cacao na Bahia. (Cultivation of cacao in Bahia.)

Bol. tech. Inst. Cacao Bahia 1, 1938, pp. 205, bibl. 18.

An account of cacao cultivation in Bahia, Brazil. The methods described are as up to date as the conditions of the country allow. The different soil types on which the crop will thrive are described. The bulletin is well illustrated throughout.

1041. VOELCKER, O. J., AND WEST, J. 633.74-2.8
Swollen shoot and die-back of cacao.

Trop. Agriculture, Trin., 1942, 19: 83, bibl. 4.

The chief characteristics of this new virus disease of the Gold Coast cacao as distinguishing it from ordinary forms of die-back are described. Distinctive yellowish or whitish chlorosis of the leaves, the veins thickened underneath but remaining green, gives the first signs of infection. Steady defoliation follows, the foliage appearing as small tufts at the end of bare whippy branches. The swollen shoots from which the disease is named result from an increase in the width of the woody tissues and are larger in chupons than in branches. Characteristic small round pods are produced. Die-back sets in and the tree dies within a year. The spread of the disease is in a circle from the focal point and is independent of age or condition of trees, of the presence of shade or the type of soil. Only incomplete information is available as to alternate host plants and insect vectors.

1042. SCHULTZ, E. F. 633.825
El cultivo de la círcuma en Tucumán. (Cultivation of turmeric in Tucumán.)

Rev. industr. agric. Tucumán, 1941, 31: 350.

Suggestions for the cultivation of turmeric (*Curcuma longa*) in Tucumán with a brief description of the most suitable methods. Since the war English supplies formerly obtained from the East are now procured from Bolivia. Production in the Argentine has hitherto not progressed because it has been difficult to interest the business houses in Buenos Ayres.

TROPICAL CROPS

1043. WALKER, G. 633.85
 Notes on *Leptospermum citratum*.
E. Afr. agric. J., 1942, 7: 202-3.
 An account of the establishment and growth of *Leptospermum citratum* on a farm in Kenya at 6,600 ft. on light sandy soil. The tree, a native of Queensland and New South Wales, might serve as a source of essential oil containing citral and citronella. Seed germinated in 16-18 days after several failures, was pricked out into boxes at 5 months and transplanted to the field 6 months later when 6-8 inches high. Trial distillations were made at intervals but the first commercial distillation was made three years after sowing the seed and yielded 371 lb. oil from 6 acres. A second distillation made 6 months later before the new growth had matured was disappointing. Distillation should not be done before the reddish colour of the young shoots has turned a copper green and possibly much later. Preliminary sun drying for 5 days before distilling reduced weight by 50% and was found to be the most economical method. Pruning experiments suggest that the trees should not be cut back below 2 ft.

1044. ANON. 633.85
Leptospermum citratum oil from Kenya.
Bull. imp. Inst. Lond., 1942, 40: 1-5.
Leptospermum citratum (Myrtaceae) is a shrub or small tree growing in the wild state in New South Wales and Queensland. It is locally known as the lemon-scented tea tree. It has been cultivated successfully and experimental plantations have been started in various parts of the country. It was considered that the oil, containing 73.5% (by weight) of aldehydes, consisting principally of citral and citronella, might be of value as a soap perfume. In Kenya plants were raised successfully from seed at a second attempt and after a year were larger enough (6-8 inches) to transplant. The seedlings damp off easily. Propagation by vegetative means was not very successful. In 4 years the trees had reached a height of 10-12 feet and had begun flowering. An experimental plantation of 6 acres started in 1939 provided at the first cutting in 1940 371 lb. of oil in all. Another section gave 158 lb. per acre. Six months later a second cutting of new shoots not fully matured gave disappointing results. Shoots are not ready to cut till the general hue of the plantation has turned from a pink copper to a copper green and possibly not even then. A period of at least 8 months between cuttings is necessary. It was found that the sun-dried leaf gave nearly the same percentages of oil (1.62) as fresh leaves (1.68) and was much easier to deal with, since not only did the stills hold more of the dry material but it could be stored until enough had accumulated to keep them working full time. Commercially the oil would be in competition with the oils of lemon grass and Java citronella, which before the war sold at 1s. 6d.-2s. lb.

1045. VINSON, L. 633.88
 Quelques plantes médicinales de Maurice. (Some medicinal plants of Mauritius.)
Rev. agric. Maurice, 1941, 20: 273-83, 329-41, 1942, 21: 3-27, bibl. 11.
 A discussion of the role played by plants in medicine with some local examples. A list of 105 medicinal plants of Mauritius is given, indigenous or introduced, classified according to the parts of the human system on which they act. In most cases much information is given concerning the medicinal properties, the parts of the plant used, methods of use, dosage, etc. Should the plant be highly poisonous, an antidote is usually mentioned.

1046. IPPISCH, F., Jr. 633.88
 Plantas medicinales y sus productos para la exportación. (Medicinal plants and their products for export.)
Rev. agric. Guatemala, 1941, 18: 146-52.
 This paper is a continuation under a slightly altered title of a recent article, *Ibidem*, 18, 53-8, H.A., 11: 1488. A number

of medicinal and insecticidal plants are considered which are in demand in the U.S.A., the import figures of that country always being quoted. If such plants are already grown in Guatemala the present position as regards their cultivation is reviewed; if they are not yet grown the possibilities of their success are discussed. The paper concludes with an extract from an article in the *Chicago Daily Tribune* by a botanical authority on Central America, Dr. P. C. Standley, in which it is stated that given capital and enterprise Guatemala could produce many much needed drugs, especially quinine.

1047. KIRKPATRICK, T. W. 632.754: 633.88.51
Helopeltis (Hem. Capsidae) on cinchona.
Amani Memoirs reprinted from *Bull. ent. Res.*, 1941, 32: 103-10, bibl. 9.
 Life history and control of the two distinct varieties of *Helopeltis* (*H. bergrothi* vars. *rubrivenis* and *disciger*) on cinchona at Amani, Tanganyika. The most effective control in small scale experiments was 1 oz. sodium arsenite, 5 lb. sugar, 4 gall. water either sprayed on the plant with a Flit pump or placed as drops on the leaves. The bait proved definitely attractive.

1048. PHILLIPS, A. D. 633.88.84.4
 Corkwood, a source of an essential drug.
Qd agric. J., 1941, 56: 416-8.
Duboisia myoporoides (corkwood), a common Queensland plant, is a powerful source of hyoscine, a drug which has become in great demand owing to the war. The plant is described as are more briefly plants with which it might be confused.

1049. O'BRIEN, T. E. H. 633.912
 Rubber investigations in Ceylon.
Emp. J. exp. Agric., 1942, 10: 61-76.
 The Director of the Rubber Research Scheme, Ceylon, gives an account of the work carried out by the research staff at the Dartonfield Estate and Nivitigaleke Experiment Stations and elsewhere both in the experimental and advisory field.

1050. WHELAN, L. A., AND DE SILVA, C. A. 633.912
 Field experiments on Dartonfield Estate. XVI. Measurements of growth in replanted areas (1940).
Quart. Circ. Ceylon Rubb. Res. Scheme, 1941, 18: 121-7.
 Three-year-old budded stumps have shown a girth response to phosphate manuring of $\frac{1}{4}$ inch, a non-significant response to potash and none to nitrogen. The pitted drain system is considered superior to the more elaborate platform and trench systems on the grounds of increased cost, the tendency to root exposure and the limited advantage in growth of the two last. Plants sown as seed at stake in August 1936 and budded December to April 1937-38 are still 5 inches in girth behind plants budded in the nursery and planted May 1936 as dormant stumps. There is no difference in girth between trees receiving organic and inorganic manuring.

1051. WHITELAW, E. W. 633.912
 Suggestions for the taking of a census in replanted or new planted areas.
Quart. Circ. Ceylon Rubb. Res. Scheme, 1941, 18: 141-2.
 Counting of young trees in replanted areas is invariably inaccurate. Examples are given, the need for accuracy for the purpose of returns to the Rubber Controller is pointed out, and a simple and foolproof method of counting is described. Brightly coloured numbered tickets are printed in rolls of 2,500 and affixed with latex, one to each tree, at a height of 5 feet and facing the nearest supervision road for easy inspection. The work must be done when rain will not wash off the tickets. As each field is dealt with

it is only necessary to record the next serial number on the roll of remaining tickets to know the exact number of plants in that area.

1052. DIJKMAN, M. J., AND OSTENDORF, F. W. 633.912
Zaailingentoetstuin Pangkalan 1929. (Seedling test garden Pangkalan 1929.) [English summary 2½ pp.]

Arch. Rubbervult. Ned. Ind., 1941, 25: 435-65, bibl. 7.

The results obtained with seedlings of 8 families of *Hevea brasiliensis* planted in 1929 are reported and the results obtained from the 4 largest families statistically analysed. Tables show for all the families, number of trees, girth and bark thickness, yield data, incidence of disease and wind damage, results of testatex tapping, effect of selection based on testatex test, frequency distribution of yields, correlation between yield, girth and bark thickness in the 5th tapping year, correlation between yields in different tapping years.

1053. RUBBER RESEARCH SCHEME, CEYLON. 633.912
Increasing the crops from Ceylon rubber estates.
Adv. Circ. Ceylon Rubb. Res. Scheme 16, 1942, pp. 5.

Suggestions are made for increasing the yield of rubber with least damage to the trees. The remarks apply to mature seedling trees. A minimum tap should be $S/2$, $d/2$ or $2S/2$, $d/4$ at 100% intensity. On low-lying estates where bark reserves are satisfactory 2 opposite spiral cuts every 3 days are recommended, i.e. $2S/2$, $d/3$, 133%. Other possible modifications of tapping systems are discussed. There should be a reserve of tappers, even if they are not highly skilled, to replace temporary absentees. The winter rest or non-tapping of trees during resolation is a practice peculiar to Ceylon without experimental data to support it. Benefits derived may be illusory. Nevertheless in view of the strain on the trees from heavy tapping it should not be discontinued though it might be curtailed by continuing to tap a week longer than usual. Manuring should continue though crop increase due to it cannot be immediately apparent. Cutting out tappable trees for replanting should cease, but reserves of planting material to take the form of stumped buddings should be built up.

1054. HUNTLEY, G. 633.912-1.874
Selected natural covers in young budded rubber.
Quart. Circ. Ceylon Rubb. Res. Scheme, 1941, 18: 128-40.

The establishment and upkeep of a mixed cover of selected indigenous plants on a rubber plantation in Ceylon is described. The method is an improvement on the slow natural regeneration by the so-called forestry method and has not, so far as is known, the tendency to deteriorate with time shown by creeping leguminous covers. Thirty-three tree species, 9 shrubs, 26 herbs and 4 creepers were used and for each of them there is tabulated the time taken to decay after cutting of stem and leaf, scientific family and local names, method of propagation, time taken for seed to germinate or cuttings to root, habit, e.g. evergreen, deciduous etc., colour of flower, season of bloom and general notes. Species listed as "would-be dictators" and therefore to be avoided are a perennial "sunflower" [presumably *Tithonia diversifolia*.—Ed.], *Clerodendron infortunatum*, *Macaranga tomentosa*, *Trema orientalis* and probably *Stachytarpheta jamaicensis* and *Ricinus communis*. Treatment consists in cutting back all mature stems twice a year to 3 ft. the first time and thereafter 6 to 9 inches above this until the time for complete removal by uprooting, an occasional plant being left as seed bearer. Thinning and supplying are carried out at every pruning when necessary. The topplings remain on the ground and very soon decay. Tables of costs are given. Care of the natural species cannot be haphazard or relegated to a general routine. It requires close personal supervision on the part of the management.

1055. VAN DER BIE, G. J. 633.912-1.56
Onderzoek van latex, verkregen van oculaties op *Hevea spruceana* hybride onderstam en op *Hevea brasiliensis* onderstam. (Latex from buddings on *Hevea spruceana* hyb. and on *H. brasiliensis* stock compared.) [English summary 4 lines.]

Arch. Rubbervult. Ned. Ind., 1941, 25: 503-9, being *Meded. Ned. Ind. Inst. Rubberonderzoek, Java*, 37, 1941.

No differences greater than those between the clones used in the experiment were found between the properties of latex from rubber budded on *Hevea spruceana* hyb. and that from rubber budded on *H. brasiliensis*.

1056. HAINES, W. B. 633.912: 581.144.4
A method for foliage comparisons in field experiments with *Hevea*.
Emp. J. exp. Agric., 1942, 10: 117-24.

The first reaction to plot treatments of *Hevea* is usually seen in the foliage: proper measurement of it would be of great use in a plant of which the other characters change slowly. A means of assessing foliage values by means of a simple viewing-device of mirror and grid has been devised with a convention for awarding marks. It is claimed that the method gives more speedy indications of tree reactions than anything hitherto generally used. The problems involved are fully discussed and some applications of the technique are described. The instrument is photographically illustrated.

1057. VOLLEMA, J. S. 633.912-1.556.8
Over den invloed van het tappen op den diktegroei van *Hevea brasiliensis*. (The effect of tapping on growth in *Hevea*.) [English summary 23 lines.]

Arch. Rubbervult. Ned. Ind., 1941, 25: 417-21.

Tapping is shown to reduce the growth in circumference of *Hevea* in proportion to the quantity of rubber drawn from the trees. Other important factors appear to be involved such as disturbance of the tree's metabolism resulting from cuts and possible physiological action of the latex on the process of growth. The experiment began in 1936. By 1941 the girth of untapped trees had increased 35%, normally tapped trees ($S/2$, $d/3$, 67%) about 24% and heavily tapped trees ($2S/2$, $d/3$, 133%) by about 17%.

1058. FORD, C. E. 633.912-2.18
Wind damage in immature rubber.
Quart. Circ. Ceylon Rubb. Res. Scheme, 1941, 18: 108-20.

An analysis of wind damage in immature rubber in Ceylon is presented for 1941. Returns were obtained for over 80-90% of Ceylon's replanted area. The enquiry was confined to 3 factors only, namely, kind of planting material, age and district. Clones T.J.1 and B.D.5 showed the expected susceptibility, but the high rate of clonal seedlings, 14 to 15 trees per thousand, was a surprise. Damage increases steadily with age to the 5th or 6th year. The subsequent decline is probably associated with the closing of the canopy. The total loss over the first 6 years works out at one tree per acre per year of age. Major damage only was analysed statistically and comprises uprooted trees and those with broken stems. Directions are given for repairing damage. *Uprooting*. Re-erect and give temporary support, possibly lighten the crown on one side. If lateral roots are broken the crown should be sawn off and the tree treated as a stumped budding. *Stem breakage*. Cut the stem across and treat as stumped budding, allow 3 well spaced shoots to grow, finally select the best one and allow it to develop naturally. *Roots loosened*. Support the 3 sides with coir guy ropes attached by loops above the first ring of branches, taking the usual precautions against chafing. *Split stem*. Rebind with wire or coir rope over soft padding until healed. *Branch breakage*. In clones developing a

master branch (specifically clone T.J.1) remove it in two or three stages allowing new growth to fill up the gap in the crown before proceeding. Standard treatment is to saw all fractures clean and tar all wounds. *Head bent over*. Re-erect and support with coir ropes: this is always successful if there is no fracture. In Ceylon pruning to prevent wind damage is unnecessary. The small response to manurial trials indicates that damage from lack of balance between crown and stem due to this cause is unimportant. Damage often occurring near gaps in the canopy might be avoided either by cutting out the selected tree in 2 or 3 stages or by thinning immediately after the S.W. monsoon to give maximum time for the canopy to reclose.

1059. (O'BRIEN, T. E. H.) 633.912-2.95
Effect of tar on young rubber.

Planters' Chron., 1942, 37: 63.

Attention is called to a note issued by the Ceylon Rubber Research Scheme to the effect that tar applied to the bark of young rubber trees as a protection against rats has caused considerable damage to the trees. The contrary statement in the "Handbook on rubber planting in Ceylon" compiled by the Research Scheme is therefore annulled. Greasy or waterproof fungicidal preparations are also harmful.

1060. POLOVENKO, I. 633.913
Rational distribution of kok saghyz. [Russian.]
Socialistic Agriculture, Moscow, 1941, No. 2,
pp. 64-73.

The last two years have witnessed a very rapid increase in the area under kok saghyz, which in 1941 was 12 times the area in 1937. The best yields are obtained when it is grown on highly cultivated soil in gardens or on peaty land. It does best when it follows hemp, tobacco, or garden vegetables. The size of field under kok saghyz should be not less than 10 hectares, so as to ensure efficient cultivation, and in the Ukraine and certain other areas 15 and even up to 20 ha.

In new areas of cultivation in the Sverdlovsk, Kalinin, Kirov and Smolensk regions, on dark grey forest steppe clays, leached chernozem and flood soils yields of 20 to 60 centners of roots per hectare have been obtained. These areas are climatically well suited to kok saghyz and possess large areas of peat.

If we exclude the harvesting of the seed, the amount of labour required by kok saghyz is about equal to that for sugar beet. Now that seed supplies are sufficient, seed collections will be limited to a few special kolhozes, and confined to the second year crop, so as to avoid treading down and the consequent loss of root yield.

1061. FILIPPOV, D. I. 633.913: 581.6: 575
Some problems of breeding kok saghyz. [Russian.]

Vernalisation, 1941, No. 3 (36), pp. 21-8.

When grown under wide spacing the root of *Taraxacum kok-saghyz* grows to a weight of 100-200 gm. Figures are given showing that the rubber content is greater in branched than in unbranched roots, and that the present tendency to select unbranched roots is erroneous. Analyses of 312 roots, the results of which are presented, show that the rubber content is in inverse proportion to the diameter of the root, since in most roots the latex vessels are less concentrated in the peripheral layers than in the centre of the root. Certain types of root exist, however, with rings of cambium scattered irregularly among the cortex. It would seem that by selecting this type it should be possible to raise both the size and rubber content of the roots. Leaf type is shown to be very much influenced by environment and is not a suitable character on which to base selection.

1062. ZASJADNIKOV, T. 633.913(47)

Spring sowing of kok saghyz. [Russian.]
Socialistic Agriculture, Moscow, 1941, No. 4, pp. 70-5.

Kok saghyz can be sown both in spring or autumn. When sowing in spring it is essential that the upper layers of earth,

0.5-1.5 cm. from the surface, be kept sufficiently moist. Stratification of the seeds is necessary before sowing. The rows should be 44.5 cm. apart so as to permit of cultivation during the growing period. A special apparatus is described and illustrated whereby pellets of soil containing the seeds can be prepared and sown in an ordinary seed drill. The pellets are subjected to stratification and then kept at 10° C. until the seeds sprout when they are immediately sown. In this way a more uniform stand is obtained and the seedlings, germinating in groups of 3-5, are more capable of penetrating the soil. About 2 peas or vetches are sown to every 10 pellets as markers and in this way inter-row cultivation can be carried out at a much earlier stage. Much larger roots are obtained by this method of sowing. Lysenko's method of planting cut roots is also described.

1063. LYSENKO, T. D. 633.913: 581.142
Good germination of kok saghyz ensures a good yield. [Russian.]

Vernalisation, 1941, No. 3 (36), pp. 3-11.

Given good germination it is thought kok saghyz seed should produce yields of from 2,225 to 3,115 lb. per acre. The seed is small, about 3,000 to the gram, and germinates only with some difficulty. Various methods of facilitating this by stratification or soaking before sowing are discussed. The seed bed needs careful preparation. Deep autumn ploughing is essential. As soon as access to the field is possible in the spring the surface should be covered with a thin layer, 0.5-1 cm. thick, of fine soil by means of a harrow or chain harrow just before sowing. Frequent cultivation is recommended during the growth period. Sowing should take place not more than 1 to 2 days after the last harrowing. The seedlings are later thinned by cutting out, gaps being made of about 10 cm. between each 3-4 cm. of the row. Propagation can also be carried out (hitherto only for experimental purposes) with small pieces of root which produce plants very much more quickly than seed. To get the roots plants are dug up early in spring before growth has started. They are dried and the upper 1.5 cm. together with the tops are cut off and kept separately. The rest of the root is cut into pieces 1-1.5 cm. long, the thicker parts being cut into shorter pieces than the thinner parts. The upper portions with the tops are cut longitudinally into 3-4 pieces and kept in a cool place. The cut pieces are at once covered with soil of normal humidity and left for about 10 days at 15-17° C. After 7-10 days small calluses will be seen at the ends of the pieces, then small roots and later shoots and leaves. They must not be allowed to dry out. On appearance of callus they can be planted out in the ground, which should have been prepared as for seed but with a thorough cultivation 2-3 days after the harrowing. Rows should be 44 cm. apart both for seed and sets; the sets should be 10 cm. apart and not deeper than 2-4 cm. The ground should be lightly harrowed after planting and shoots should appear 7-10 days after planting. The roots produced on well-manured soil will weigh not less than 50 grammes, be branched and have a high rubber content. The yield should be considerably more than from seed. To sow 1 acre about 44 lb. roots will be needed. It should be noted that the pieces with tops attached should be planted separately, as they will flower earlier.

1064. MYNBAYEV, K. 633.912-1.535.6
The vegetative propagation of kok saghyz. [Russian.]

Soviet Plant Industry Record, 1940, No. 1, pp. 60-2.

On the basis of a study of various methods of propagating kok saghyz vegetatively, the writer has drawn the following conclusions:

1. Kok saghyz is a plant well adapted to vegetative propagation, even by root cuttings as short as 1.0 to 1.5 cm. 2. The best method is to cut the roots crosswise and lengthwise into pieces from 1.0 to 1.5 cm. long. 3. The method of dividing the roots early in the spring before they have begun to

sprout—although a high percentage of such cuttings take root and the plants begin to flower after 40-45 days, depending on the stage of phasic development in which the initial plant happens to be—has the drawback that the formation of the main root is retarded. This method proves useful, however, when it is necessary to obtain a large number of flowering plants. 4. The best time of year for vegetative propagation is in late spring—April to the first half of June. This refers to plantings direct in the field; in the greenhouse this type of propagation can be carried out at any time of year, provided active growth is in process and the proper environmental conditions are supplied. 5. When cuttings are planted in the fall, i.e. directly after the roots are dug up, it is necessary to cut off and discard not only the tops but about 1.5-2.0 cm. of the neck of the root, since cuttings made from this part of the root, although producing good shoots at first, soon die. This is due to the fact that this older part of the root quickly rots. 6. The best soil for growing root cuttings of kok saghyz is humus with a thin layer (about 2 cm. thick) of sand on top or ordinary (light loam) soil with the addition of superphosphate (at the approximate rate of 0.15 to 0.25 gm. to 1 kg. of soil). [Author's summary.]

1065. NEIMAN, G. B. 633.913: 581.6

Effect of cultivation upon the quality of rubber in kok saghyz roots. [Russian.]

Proc. Lenin Acad. agric. Sci. Moscow, 1941, No. 9, pp. 12-3.

Intensive manuring greatly increased the nitrogen content of kok saghyz; high nitrogen and high K lowered the rubber content, phosphates raised it in moist years but lowered it in very dry years. The highest rubber content is produced by a combination of N and P in the proportion 1:1. Nitrogen tends to reduce the amount of sugars, P and K to increase it. These effects can be explained by the effect that nitrogen has in stimulating leaf development, which tends therefore to reduce the stores in the root. The best rubber quality is only obtained with full mineral manuring in addition to dung; phosphates invariably improve the quality and potash seems to have the same effect. Wide spacing also improves the quality. The effect of manuring and spacing on composition, i.e. quality of roots, is shown in tables.

1066. NEIMAN, G. B., AND SOSNOVETZ, A. A. 633.913

Regarding the summer rest period in kok saghyz. [Russian.]

Proc. Lenin Acad. agric. Sci. Moscow, 1941, No. 2, pp. 15-7.

Kok saghyz tends to lose its leaves and pass into a rest period in the summer, and this may even happen twice if a drought occurs in the second period of vegetation. This can be prevented by shading and plants grown in frames showed no signs of summer dormancy.

1067. MASHTAKOV, S. M. 633.913: 581.192

Qualitative variations of rubber in the roots of kok saghyz in the second year of vegetation.

C.R. Acad. Sci. U.R.S.S., 1939, 24: 509-12, bibl. 3.

A continuation of the trials recorded in a previous paper *Ibidem* 1938, Vol. 19, No. 4, which concerned quality of the first year rubber.

1068. GREENWAY, P. J. 633.913

Wild rubber in East Africa.

E. Afr. agric. J., 1942, 7: 224-7, bibl. 7.

Notes on some plants which have served and serve in a diminishing degree as sources of wild rubber in East Africa. The plants discussed are *Funtumia elastica*, *Landolphia* spp., *Clitandra orientalis*, *Mascarenhasia elastica*. Botanical and analytical data are given. The most important rubber plant of East Africa is *Landolphia kirkii*. Improved economic conditions have removed the incentive for wild rubber

collection by the natives and there has been considerable reduction of wild rubber communities by clearing for cultivation of agricultural crops.

1069. REGEL, C. 633.913

Beiträge zur Kenntnis von mitteleuropäischen Nutzpflanzen. (Economic plants of Central Europe.)

Angew. Bot., 1941, 23: 117-23.

The rubber-producing properties of *Euonymus verrucosa* and *E. europaeus* are briefly reviewed.

1070. ANON. 634.1/8

Fruit-growing possibilities in Ceylon.

Crown Colonist, 1942, 12: 278.

A general account of the present condition of fruit growing in Ceylon with proposals for improved methods of cultivation and organized marketing, based on the report of a committee appointed to make recommendations to the Government for the development of the industry.

1071. PUNJAB DEPARTMENT OF AGRICULTURE.

634.1/7-2.11/18

Safeguarding fruit trees from heat, cold and wind.

Bull. U.P. Dep. Agric., Fruit Ser., 16, 1942, pp. 9, 2 annas, being *Leaflets. Punjab Dep. Agric.* 51, 69 and 81.

The measures discussed are those commonly used. Against sunburn shade or whitewash the trunk, against wind plant windbreaks, against cold cover with various materials, use windbreaks, flooding or smudging. Treatment of frost-affected trees is also discussed. A list of mangoes thought to be more frost-resistant than the majority is given and various types of citrus are arranged in order of their resistance to cold.

1072. RICHARDS, P. B., AND SHARMA, H. N.

634.1/7-2.7

Control methods and materials. On the damage caused by insects on some commonly grown fruits in the plains of the United Provinces.

Bull. U.P. Dep. Agric., Fruit Ser., 3, 1940, pp. 17, 4 annas.

Pests of the following fruit trees and their control are somewhat briefly discussed:—mango, litchie, guava, jack-fruit, jujube, fig, citrus, pomegranate, papaw, banana, melons and other gourds, singhara (*Trapa bispinosa*).

1073. ALLAN, R. G.

634.1/7: 658.8

Sundry papers on fruit development, fruit growers organization and the necessity of improving the basis of marketing.

Bull. U.P. Dep. Agric., Fruit Ser., 11, 1939, pp. 27, 3 annas.

I. The objects and need of organized effort and the establishment of a central fruit board for the U.P. are discussed. A brief resumé is given of the work of the world's most important fruit growers' associations. II. The creation of subsidiary associations, their types, objects and development and relations with the central board. III. Notes on the marketing of fruit in the U.P. Weaknesses of the system and suggestions for improvement and for future development.

1074. BURNS, J. G.

634.1/7

Fruit culture in the hills.

Bull. U.P. Dep. Agric., Fruit Ser., 10, 1939, pp. 6, 2 annas.

General instructions for planting and cultivating various deciduous fruit trees in the hilly tracts of Garhwal and Kumaun, United Provinces, India. A sketch map to illustrate contour draining is supplied. A list of suitable varieties for planting is given.

1075. HEAD, W.

634.1/7-1.536

The planting and early care of young fruit trees.

Bull. U.P. Dep. Agric., Fruit Ser., 1, 1941,
pp. 7, 2 annas.

The information provided has special reference to conditions in the United Provinces, India. Prepared holes $3 \times 3 \times 3$ ft. should be made to receive young oranges and plums; larger trees such as mangoes require a hole $4 \times 4 \times 4$ ft. One-fourth of the soil should be replaced with manure mixed with the remainder of the soil when planting. A warning is given against planting elderly pot-bound trees which look well in the nursery but fail to start when put out, or trees which have been raised in open ground but have never been regularly transplanted in the nursery. Nursery trees 3 or 4 years old are probably those which have been passed over by purchasers in favour of better trees and are best avoided. Younger trees give much better results. Notes are given on stocks, planting time and methods and watering. Clean cultivation is advised. Light protection against frost and heat may be needed and a method of providing this by means of stakes and hay is described, as also a method of dealing with white ants.

1076. STONE, A. 632.77: 634.1/8

The fruitflies of the genus *Anastrepha*.*Misc. Publ. U.S. Dep. Agric. 439, 1942, pp. 112,
bibl. 10, 40 cents.

Particulars are given of the economic importance of the fruit flies of the genus *Anastrepha*, of their various food plants, of their geographical distribution—between latitudes 27° N. and 35° S., but largely tropical—and of their specific characters. A key to species is given. Each species is minutely described with explanatory illustrations of wings and/or ovipositor.

1077. SINGH, C. P. 634.16

The loquat.

Bull. U.P. Dep. Agric., Fruit Ser., 19, 1940,
pp. 12, 3 annas.

Instructions for cultivation and propaganda of the loquat in the United Provinces, India. There are 3 flowerings a year of which the second only is fully productive. This is borne on 6 months old branches which become active soon after the first flowering. Should flowering be heavy in the first flush even though fruit set be poor, the yield of the second flush will be much reduced for reasons which are given.

1078. SMITH, W. S. 634.421

The guava.

Bull. U.P. Dep. Agric., Fruit Ser., 8, 1941,
pp. 11, 4 annas.

Instructions for the proper cultivation of the guava in the United Provinces, India. Notes are included on the renovation of old or badly managed orchards.

1079. ALLAN, R. G. 634.441

Modern mango cultivation.

Bull. U.P. Dep. Agric., Fruit Ser., 13, 1940,
pp. 45, 7 annas.

Written with special reference to the United Provinces, India. All aspects of cultivation are dealt with. There is a useful section on propagation.

1080. VYAS, N. D. 634.571

The lichi.

Bull. U.P. Dep. Agric., Fruit Ser., 12, 1940,
pp. 10, 4 annas.

Instructions for cultivation in the United Provinces, India.

1081. HUMPHREY, N. 634.58

A note on groundnut selection work.

E. Afr. agric. J., 1942, 7: 220-1.

The selection of strains of groundnut resistant to wilt has been successful enough to render the crop an economic one for natives in coastal Kenya. Selection of seed nuts on an

arbitrary number of nuts per parent plant had no effect in producing higher yielding strains. It was noted for further attention that if the number of nuts per parent plant exceeded 100 the progeny would probably show a slight reduction in nut yield. Nut weight appears to be a hereditary character. A close connection between germination and nut weight has been found which has permitted a considerable improvement in germination by taking nut weight into account when individual plant selections have been made. These results were obtained at the Coast Experiment Station, Kibarani, Kenya.

1082. MEHTA, T. R. 634.58

Extension of United Provinces groundnut cultivation.

Indian Fmg, 1942, 3: 85-6.

Among the proposals for improvement are: (1) The use of an early, high-yielding nut with high oil content such as T18, T23, T24, which would have the added advantage of enabling the grower to take a second crop such as wheat or barley. (2) The establishment of local grading stations, which will enable the small cultivator to obtain higher prices for high quality nuts, e.g. with high oil content; hitherto such nuts have been purchased by the mills at the same rate as the inferior local sorts, thus discouraging any attempt at improvement. (3) The breeding of improved varieties to combine high oil content with high yield and to increase the size of the kernel for the benefit of growers catering for the roasted nut trade.

1083. BONDAR, G. 634.6

Palmeiras da Bahia. (Palms of Bahia, Brazil.)
Bol. Inst. cent. Fom. econ. Bahia 6, 1939, pp. 22.

The following palms are described from Bahia, Brazil. *Cocos romanzoffiana*, *C. campos-portoana* sp.n., *C. botryophora*, *Diplothemium caudescens*, *D. maritimum*, *D. campestris*. The economic uses of these palms, if any, are mentioned. The author regrets that the native palms are not used more in public gardens. They are fully as ornamental as many of the exotic species cultivated. A garden should be established exclusively for the study of palms, especially the economic possibilities of those indigenous to the country.

1084. BONDAR, G. 634.6

Palmeiras na Bahia do genero *Cocos*. (Palms of Bahia of the genus *Cocos*.)

Bol. Inst. cent. Fom. econ. Bahia 4, 1939, pp. 19.

The following palms, natives of Bahia, Brazil, are described and illustrated. *Cocos botryophora*, *C. schizophylla*, *C. coronata*, *C. mataiforme*, *C. vagans* and *C. tostata*. Their products are noted. The last three are hitherto undescribed species.

1085. BONDAR, G. 634.6

O licuriseiro (*Cocos coronata* Mart.) e suas possibilidades na economia brasileira. (The economic possibilities of *Cocos coronata* in Brazil.)

Bol. Inst. cent. Fom. econ. Bahia 2, 1938, pp. 18.

Cocos coronata, popularly known as licuriseiro, is one of those palms which seem to fill the role of universal provider to the locality. In this instance the leaves serve as fodder, as roofing for houses and for the manufacture of hats, to mention a few of their uses. The trunks provide a flour which supports the population in dry years. The pulp of the fruit makes a drink appreciated by both man and his cattle. The green nuts after cooking make a palatable dish. The kernels of the ripe nuts are strung as beads and used as necklaces for children. A commercial house in Bahia has for some years extracted an oil from the nuts which has proved profitable. In 1935 a wax was manufactured, which on investigation may prove a substitute for carnauba wax [the waxy coating of the palm *Corypha cerifera*; this wax will develop only in certain arid regions of Brazil.—ED.]. The process is discussed in general terms and some difficulties attending it are mentioned.

* *Trop. Agriculturist*, 1937, 88 : 297-303. *H.A.*, 1938, 8 : 254.

* See also 873, 874

1086. BONDAR, G. 634.6
Importancia económica das palmeiras nativas do gênero *Cocos* nas zonas secas do interior bahiano. (Economic importance of the native palms of the genus *Cocos* in the dry zones of the Bahia, Brazil.)
Bol. Inst. cent. Fom. econ. Bahia 5, 1939, pp. 16.
The economic possibilities of the palms *Cocos coronata* Mart. and *C. vagans* Bondar in the district surrounding the municipality of Sta. Therezinha in the province of Bahia, Brazil, are discussed. The area is about 241,600 hectares with a population of 16 to the square kilometre. The chief industry is sheep and cattle and pig raising, the animals existing almost entirely on the natural resources of the land. The 2 palms in question are of great importance in providing for both man and beast by means of their fruit or foliage. *C. coronata* grows in large stands over a great part of the municipality. It is slowly but surely being destroyed by indiscriminate grazing and by the continual removal of the foliage by the inhabitants for many domestic purposes. The probable yield and value of nuts under ungrazed conditions is calculated and with proper cultural attention could probably be doubled. *C. vagans* Bondar has a horizontal subterranean trunk often several yards in length. Only the foliage and inflorescences appear on the surface and these change their position with the elongation of the trunk. The latter also sends out terminal ramifications, which in turn produce fruiting heads. This palm produces oil-bearing nuts which are easier to collect than those of the taller *C. coronata* though the fruiting period instead of being continuous as in *C. coronata* is seasonal. Methods of protecting and increasing these palms are discussed.

1087. BONDAR, G. 634.61
O coqueiro (*Cocos nucifera* L.) no Brasil. (The coconut in Brazil.)
Bol. Inst. cent. Fom. econ. Bahia 7, 1939, pp. 100, bibl. 39.
The coconut industry and methods used in the cultivation of this palm in Bahia are reviewed and improvements which could usefully be made are pointed out. Emphasis is laid on the great increase in yield which can be obtained by proper attention over those plantations which are left more or less to look after themselves. Planting distances should be 8 to 10 metres. Though a well grown tree in good health will produce 400 nuts equal to 35 kg. of oil a year the average plantation yield is more in the nature of 100 nuts per tree. A plantation of 156 palms covering 1 hectare will take annually from the soil at this rate of production through its nuts alone 130 kg. nitrogen, 43 kg. phosphoric acid, 139 kg. potash and a considerable quantity of calcium. This must be replaced by some form of manurial treatment and suggestions are made as to how this can best be done. Suitable methods of combating pests and diseases are described.

1088. AGNEW, G. W. J. 634.651
Notes on the papaw and its improvement in Queensland.
Qd agric. J., 1941, 56: 358-73, bibl. 17.
The article gives a very clear account of the flower and plant types of the papaw (*Carica papaya*), their relation to fruit production and the steps which must be taken by the grower to improve his stock or to maintain and increase any high yielding strain that he may possess. There are many illustrations of the various flower and fruit types.

1089. (UNITED FRUIT COMPANY) 634.771-1.67
Overhead irrigation of bananas in Honduras.
Trop. Agriculture, Trin., 1942, 19: 62.
A description of the water sprinkling apparatus which has been used so successfully in Honduras. The effect produced is that of very heavy rain.

1090. MEREDITH, C. H. 634.771-2.48
The effect of chemicals on *Fusarium oxysporum cubense* growing in the soil.
Phytopathology, 1942, 32: 182-4, bibl. 2.
Of 100 chemicals tried 43 killed *Fusarium oxysporum cubense*, the Panama disease of bananas, in the soil when applied at certain strengths of which the highest non-toxic and the lowest toxic points are tabulated. In 56 other cases the fungus was not killed by a 50% mixture.

1091. LEWCOCK, H. K. 634.774-1.8
Fertilizing pineapples in war time.
Qd agric. J., 1941, 56: 272-6.
All Australian supplies of potash, a very large proportion of phosphoric acid and about half the nitrogen requirement have to be imported. Strict rationing is therefore necessary. There are special regulations covering potash-rich soils. Pineapple growers are advised to concentrate on manuring the younger plantations at the expense of the older ratoon fields. The best way of recasting the fertilizer programme is worked out. It is suggested that meatworks fertilizer, i.e. dried blood and bone, should only be applied to pineapple in the bottoms of furrows opened up along the lines of the rows before planting. Suggestions are made for building up the nitrogen supply by planting leguminous crops during the intercycle period for use with the succeeding pineapple crop. It is advisable to use only inoculated seed.

1092. SLOAN, W. J. S. 635.64: 632.6/7
The control of tomato pests [in Queensland].
Qd agric. J., 1941, 56: 277-94.
The injuries are described for the purposes of recognition and control measures are suggested for 17 pests of tomato in Queensland.

1093. SUMMERVILLE, W. A. T. 635.65: 631.8
Beau fertilizer investigations during 1941.
Qd agric. J., 1941, 56: 374-7.
Manurial trials with beans on the north coast of Queensland showed that though a nitrogenous fertilizer was required this should not exceed the equivalent of 1 cwt. sulphate of ammonia per acre or yields may be depressed. Superphosphate at the rate of 3 cwt. per acre and possibly appreciably more will increase yields. The addition of potash seems unnecessary. The fertilizers are best applied between 2 and 4 inches directly below the seed at planting.

1094. VASUDEVA, R. S. 635.659: 632.8
A mosaic disease of cowpea.
Indian J. agric. Sci., 1942, 12: 281-3, bibl. 2.
Symptoms and histology of a virus disease of Punjab type 1 cowpea (*Vigna catjang*) are described from Lyallpur. It has not been determined whether the disease has been previously described.

1095. VERMAAT, J. G. 631.42
Uniforme grondmonstername ten behoeve van het landbouwkundig onderzoek. (Uniform soil sampling in aid of agricultural investigations.) [English summary 12 lines.]
Arch. Theecult. Ned. Ind., 1941, 15: 263-83, bibl. 5.
JOOSTEN, J. H. L. 631.459
Ontwikkeling en problemen van de bemoeienis van den Landbouwvoorlichtingsdienst met de bodembescherming in West Java. (Development and problems resulting from the work done by the Agricultural Extension Service in the field of soil conservation in West Java.) [English summary 1½ pp.]
Landbouw, 1941, 17: 1063-80, bibl. 10.
STAPLES, R. R. 631.459
Combating soil erosion in the Central Province of Tanganyika Territory. II.
E. Afr. agric. J., 1942, 7: 190-5, bibl. 9.
For I see *Ibidem* 1942, 7: 156-65.

TALATI, R. P. 631.863: 631.67
The disposal of Poona sewage for irrigation and cropping.
Indian J. agric. Sci., 1942, 12: 164-77, bibl. 8.

SRIVASTAVA, R. C., CHATURVEDI, H. S., AND RAO, K. A. N. 631.87: 633.61
Utilization of press-mud, cane-trash and bagasse in the cane fields. I. Composting by aerobic decomposition.
Indian J. agric. Sci., 1942, 12: 158-63, bibl. 1.

PRUTHI, H. S., AND SAMUEL, C. K. 633.71-2.8
Entomological investigations on the leaf-curl disease of tobacco in Northern India. V. Biology and population of the white fly vector (*Bemisia tabaci* Gen.) in relation to the incidence of the disease.
Indian J. agric. Sci., 1942, 12: 35-57, bibl. 13.

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1096. MENENDEZ (LEES), P. 664.8.037
Normas en vigencia en la industria frigorífica de los Estados Unidos de Norte América con la finalidad de procurar su "mejor servicio." (Regulations relating to commercial refrigeration in U.S.A. designed to procure a better service.) [English summary 18 lines.]
Reprinted from *Rev. Assoc. Ing. agrón. Uruguay*, 1941, No. 4, pp. 7, bibl. 1.
Certain refrigeration regulations in force in various States in U.S.A. are discussed with relation to the framing of suitable laws for the control of the industry in Uruguay.

1097. FAES, H., STAHELIN, M., AND AUBERT, P. 664.85.11.037+664.85.13.037
Recherches sur la conservation des pommes et des poires. (Swiss work on cold storage of apples and pears.) [German summary 4 pp.]
Ann. agric. Suisse, 1942, 43: 207-77, bibl. 24.
The authors in their account of work at Montagibert-Lausanne, Geneva, Pully and elsewhere describe the careful methods adopted over a period of years to find optimum cold storage, cellar and ordinary room storage conditions for Swiss-grown apples and pears. Temperatures, humidities, storage diseases, both parasitic and physiological, and waxing are all discussed and details of the treatments applied and results achieved are given for the following apples:—Belle de Boskoop, Reinette du Canada, Reinette grise, Reinette grise d'Orion, Reinette Ananas, Reinette de Champagne, Reinette de Landsberg, Franc Roseau, Calville blanc d'hiver, Cox's Orange Pippin, Winter Banana, Ontario, Jonathan, Delicious and Granny Smith; and pears:—Passe Crassane, Beurre Diel, Doyenné d'hiver, Doyenné du Comice, Doyenné d'Alençon, Duchesse d'Angoulême, Bergamotte d'Esperen, Louise Bonne d'Avranches and Alexandrine Douillard.

1098. H. 664.84+664.85
Das Obst- und Gemüsekühlhaus St. Margrethen. (A cold store for fruit and vegetables at St. Margrethen.)
Schweiz. Z. Obst. u. Weinb., 1941, 51: 36-9.
Notes on the dimensions of a new cold store for fruit and vegetables erected in East Switzerland. The actual storage area is 2,480 square metres while the cold storage capacity is 8,400 cubic metres.

1099. THOMAS, M., AND FIDLER, J. C. 664.84.11: 546.267
Studies in zymasis. VIII. The discovery and investigation of aerobic HCN zymasis in apples

BROWN, D. D. 633.71-1.55/56
Tobacco culture in Southern Rhodesia. Harvesting and curing Virginia type tobacco.
Rhod. agric. J., 1942, 39: 51-66.
Important operations concisely described.

KEITHAN, E. 633.74
The cacao industry of Brazil.
Trop. Agriculture, Trin., 1942, 19: 93-7, reprinted from *Econ. Geog.*, 15: 195-204.

VAN NEDERVEEN, G. 633.912-1.56
Kleurmetingen bij latex en daaruit vervaardigde rubberfilms. (Colour measurement of latex and of the rubberfilms manufactured from them.)
Arch. Rubbert. Ned. Ind., 1941, 25: 467-81, bibl. 26, being *Meded. Rubber-Stichting, Delft*, 25, 1941.

JOHNSON, F. H., AND HEAD, W. 634.1/7
Orchards; their making and maintenance on the plains of the United Provinces.
Bull. U.P. Dep. Agric., Fruit Ser., 4, 1940, pp. 14, 4 annas.

treated with hydrogen cyanide; and comparisons with other forms of zymasis. IX. The influence of HCN on the respiration of apples and some evaluations of the "Pasteur effect".
New Phytol., 1941, 40: 217-39, 240-61, bibl. 22.
A discussion of recent work at Newcastle on zymasis in apples and facts disclosed by it.

1100. TILLER, L. W. 664.85.13
Controlling wilt in Winter Cole pears.
Orchard. N.Z., 1942, 15: 4: 13.
Winter Cole pears from a commercial orchard were packed in standard boxes lined at bottom, sides and top with moisture-resisting waxed paper. The fruit was separately wrapped in "copperized" paper. After 24 weeks' storage under standard conditions only 7% of wilt was shown, while in the unlined controls (the fruit being similarly wrapped and in all respects comparable) about 50% of wilt occurred.

1101. OVERHOLSER, E. L., AND OTHERS. 664.84.037+664.85.037
Locker freezing of fruits and vegetables.
Pop. Bull. Wash. agric. Exp. Stat. 161, 1941, pp. 34.
Instructions for those who use refrigerated lockers at any of the 2,870 locker plants now established in U.S.A. It is said that cold storage lockers are now numerous enough to be affecting the dietary habits and even the modes of life of rather large sections of the population. Technique of food freezing varies with the product and is precise rather than difficult. Specific directions are given for freezing such fruits and vegetables as lend themselves to it.

1102. TRACY, P. H. 664.85.037
Frozen desserts.
Circ. Ill. Coll. Agric. Ext. Serv. 518, 1941, pp. 28.
Many of the recipes are for the use of fresh fruits in conjunction with home-made ice cream.

1103. TROUT, S. A. 664.85.038+664.84.038
The preparation of emulsions for coating fruit and vegetables.
J. Coun. sci. industr. Res. Aust., 1942, 15: 26-32, bibl. 5.
Experiments on a laboratory scale indicate that although wax coatings are often effective in prolonging storage life they cannot be applied indiscriminately to all fruits without risk of producing severe internal disorders and fermented fruit. Methods are described for preparing various oil emulsions and "colloidal" wax emulsions for fruit dips in which the hydrogen-ion concentration is adjusted for

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each particular wax by using alkaline solutions containing mainly sodium bicarbonate. A clear bright film is required and is obtained when the average size of the dispersed particles is less than one micron in diameter. Such preparations are termed "colloidal" emulsions.

1104. BERRY, W. E. 664.85.11.038
Note on the use of oil emulsions to prolong the storage life of apples.

A.R. Long Ashton agric. hort. Res. Stat. for 1941, 1942, pp. 23-4.

Cox's Orange, Crawley Beauty and King Edward VII apples—in which, however, only the King Edwards appear to have been a good fresh sample—were dipped in 5 different solutions and the effect on their storage life at Long Ashton was noted. The best results were got by the liquid paraffin emulsion dips applied to the King Edward apples, the arachis oil solution—slightly weaker than that used at Ditton*—not being so successful. Results with the other varieties were poor.

1105. ANON. 664.85.31.038

The waxing of citrus fruits.

Fruit World, Melbourne, 1942, 43: 2: 4-5.

The results of trials of the waxing of citrus fruit carried out by the C.S.I.R. of Australia and in America are discussed. Three different processes are briefly mentioned. Waxing has been shown to reduce the rate of shrinkage to between 60% and 40% of that of untreated fruit. The alkalinity of the emulsions should be kept as low as possible. If the fruit has passed through an alkaline bath such as a detergent solution shrinkage may be severe unless followed by a clean water bath. It is recommended that such fruit should always be waxed. Waxing does not control mould wastage. This is done by immersion in a 5% borax or 25% Shirilan W.S. solution. The borax increases the rate of wilting but loses efficiency if rinsed off. Fruit so treated should be waxed. The Shirilan can safely be added to the waxing emulsion bath but borax so added increases the rate of wilting.

1106. CRANG, A. 664.85.035.1

Preserving fruit with the "Campden fruit preserving tablets". Progress report.

A.R. Long Ashton agric. hort. Res. Stat. for 1941, 1942, pp. 118-24, bibl. 2.

The method of preserving fruit with potassium or sodium metabisulphite tablets proves satisfactory with acid fruits but not with such fruits as wild blackberries, sweet cherries or pears, tomatoes or other vegetables; in these fermentation generally occurs after a time. Methods of covering the jars are discussed. In practice several other methods as well as that of corks waxed over the top have proved reasonably satisfactory. It is noted that prior to use the fruit should be boiled for 10 minutes in an open pan before sugar is added. Further boiling should then continue for at least another 10 minutes. The preservative has a toughening effect on the skins of certain fruits.

1107. CHARLEY, V. L. S., AND OTHERS. 664.85.22.035.1

The large scale preservation of plums by the sulphur dioxide cold process.

A.R. Long Ashton agric. hort. Res. Stat. for 1941, 1942, pp. 86-95.

This article affords a condensed statement showing that the cold process for plums merits the fullest reconsideration during wartime by the jam industry. Despite greater losses of pectin satisfactory sets were obtained in all jams made from cold processed fruit. Liquors containing from 800 to 2,000 p.p.m. SO₂ were equally effective. Neither the variety nor maturity of the plums appeared to affect the preservation process. Although the SO₂ content of the liquid fell to 220-260 p.p.m. after 14 months, preservation was still effective. The 7 different materials tested proved

satisfactory as linings for storage vessels. Liquid sealing with paraffin oil was tested and is discussed. Suggestions are made for utilizing the residual liquor. Details are given of the cold process preservation of 5 tons of plums. It would seem easily possible to dispose of plums thus preserved during the winter to housewives for ordinary cooking purposes, since casks keep sound for several days after opening.

1108. L., E. R. 664.85.037: 551.566.1
The Low Temperature Research Station 1936-41.

Trop. Agriculture, Trin., 1942, 19: 63-4.

A brief account of the operation, work and progress of the Low Temperature Research Station at the Imperial College of Tropical Agriculture, Trinidad, for the years 1936-41 not already covered by the publications of the station. During this period certain alterations of considerable benefit have been carried out and are described, but complete modernization has not been possible within the limits of the finance available, thus the Station's equipment cannot reproduce conditions comparable with those in the holds of modern banana boats.

1109. METLICKI, L. V., AND TALJKOVSKI, A. I. 664.84: 635.1/7: 631.531

The storage of plants intended for seed production.

Sadey i Ogorod, 1941, No. 1, pp. 22-3.

The winter storage of root crops destined for seed production the following summer is discussed. It is noted that the preservation of a temperature of about 1° C. and an air humidity of 90% or more is essential to success, but how to achieve this is not made clear.

1110. HILBORN, M. T., AND BONDE, R. 664.84.21.037

A new form of low-temperature injury in potatoes.

Amer. Potato J., 1942, 19: 24-9, bibl. 4.

A new low-temperature storage injury of potatoes, popularly known as mahogany rot, from commercial store houses in Maine is described. The authors propose the name "internal mahogany browning". Varieties Chippewa and Katahdin stored at 32° F. exhibited the injury but Green Mountain did not. No injury was shown at 38° F. Yield was reduced by planting seed affected by this injury.

1111. NEFF, M. S. 664.84.937.34

Effects of storage conditions on cut roses.

Bot. Gaz., 1942, 103: 794-805, bibl. 22.

Cut rose buds may be maintained in the desired state of maturity during storage at low temperature by avoiding placing the stems in water or aqueous solution during such period. The same results can be obtained by storing in an atmosphere containing added carbon dioxide or carbon dioxide and a reduced amount of oxygen. Roses stored at low temperatures tend to develop objectionable colour. As a rule roses which have been stored do not maintain satisfactory petal turgidity or petal colour on removal from store to room temperature with their stems in water. Solutions containing water, sucrose, and a salt of certain heavy metals may materially aid in maintaining petal colour and turgidity of roses. [From author's summary.]

1112. DEY, P. K. 664.84.21.037

Cold storage of potatoes.

Sci. Publ. Dep. Agric. U.P. India 45A, 1937 (received 1942), pp. 12, bibls. 6 and 1, 4 annas.

With particular reference to India.

LYON, C. J. 664.84.21

A non-osmotic force in the water relations of potato tubers during storage.

Plant Physiol., 1942, 17: 250-66, bibl. 10.

PLATENIUS, H. 664.84.

Effect of temperature on the respiration rate and the respiratory quotient of some vegetables [after harvest.]

Plant Physiol., 1942, 17: 179-97, bibl. 17.

* See *Gdnrs' Chron.*, 1941, 110: 113, *H.A.*, 11: 1450.

PROCESSING AND PLANT PRODUCTS.

1113. RÍVAS, J. G., AND VITORIA, J. C. 663.813: 634.11
Preparación de jugo de manzana. (Preparation of apple juice and analytical studies of some similar commercial products.) *Rev. B.A.P.*, 1942, 25: 41-50, bibl. 5.
Instructions are given for the manufacture of apple juice in the Argentine, based on investigations carried out by the authors at Instituto de Industrias Agrícolas, Buenos Aires. The juices prepared at the Institute are analytically compared with commercial samples. Certain conclusions appear in the summary, namely: 1. The Argentine has excellent material available which is now wasted. 2. Heating the juice to a temperature equal to or greater than that at pasteurization and the addition of the tannin-gelatine solution gives perfect clarification. 3. The juice can be preserved unaltered for long periods if subjected to two heat treatments, namely at 74° C. for 10 minutes and after a 48-hour interval at 78° C. for 20 minutes. No cooked taste is noticeable. Further experiments are being directed to the reduction of these heat treatments to one only. The addition of CO₂ in many cases improves the flavour. 6. The commercial products analysed were of a high grade of purity.

1114. ANON. 663.813: 634.31
New standards developed for canned orange juice. *Fruit Prod. J.*, 1942, 21: 163-4, 189.
The Agricultural Marketing Service of the U.S. Department of Agriculture has developed new standards for grades of canned orange juice to take effect from March 2, 1942. In this paper they are defined and explained.

1115. CRUESS, W. V. 663.813
Fruit concentrates and their use. *Fruit Prod. J.*, 1942, 21: 165-9, 187, 190, bibl. 17.
Recent work on the preparation and uses of fruit concentrates is discussed. The subjects covered are:—“Squash” syrups; concentration in vacuo; recovery of volatile flavours and odours; flash pasteurization of juice used; concentration by freezing; review of literature; value of deaeration and inert gases; recent experiments on freezing concentration; concentrates from dried fruits; preservation; deterioration of fruit concentrates; blends; use of concentrates in carbonated beverages.

1116. CHARLEY, V. L. S., HOPKINS, D. P., AND POLLARD, A. 663.813: 634.11
Malic acid as a by-product in the production of apple treacle. *A.R. Long Ashton agric. hort. Res. Stat. for 1941*, 1942, pp. 96-101, bibl. 2.
1. A method is described whereby malic acid can be isolated from the crude calcium salts obtained in the evaporation of neutralized apple juices. 2. The conditions required to obtain precipitation of the salts are given. [Authors' summary.]

1117. CHARLEY, V. L. S., HOPKINS, D. P., AND POLLARD, A. 635.13: 631.56
The utilisation of surplus carrots. A. Production of treacle. B. Pomace as a feeding stuff and source of pectin and carotene. C. Fermentation products. *A.R. Long Ashton agric. hort. Res. Stat. for 1941*, 1942, pp. 102-9.
A process is described whereby carrots are processed into a concentrated juice or treacle with 50-60% natural sugar and a dried pomace. As an animal feed the pomace has about the same nutritive value as dried sugar beet residues. The dried pomace has about one-third to one-half the value of apple pomace as a source of pectin but special methods are necessary for its extraction. The carotene can be extracted by organic solvents or arachis oil. Carrot fermentation products have so far proved unsatisfactory.

1118. HOPKINS, D. P. 635.126 : 631.56: 577.16
Concentrated swede juice as a source of vitamin C. *A.R. Long Ashton agric. hort. Res. Stat. for 1941*, 1942, pp. 131-2.
It is considered that 1 ton of swedes should produce about 150 gals. of juice and this should yield between 12 and 13 gallons of treacle of high gravity and vitamin C value. It is thought that the come back flavour “not unlike pepper or black mustard” combined with an odour of the “cabbage water” type might easily be disguised.

1119. OSTERWALDER, A. 663.25
Zur Förderung der Reinhefe-Zucht für die Wein- und Obstweingärung. (The production of pure strains of yeast for wine and fruit wine fermentation.) *Landw. Jb. Schweiz*, 1942, 56: 169-201.
The aim of the work here described was to discover ways and means of the easier and cheaper production of pure yeast cultures. It was found that the best culture medium was as follows:—23 litres grape juice diluted to 100 litres, plus 2.5-5 kg. of beet sugar and 50 g. of sulphate and phosphate of ammonium. The medium must be kept well aerated by the provision at the end of the aeration tube of a finely perforated glass stopper wrapped in fine cloth or of a piece of pumice stone. On such a medium it is found possible to produce 14-15 kg. of centrifuged yeast per 100 litres grape juice as against the 1.2 kg. produced by the old process. Almost as much selected yeast can be produced on a medium consisting of 1 hectolitre of grape juice reduced to 10° Oechsle by dilution plus 100 g. sulphate and phosphate of ammonium. The use of concentrated grape juice gives a much smaller return. Yeast returns fell if pear juice was substituted for grape juice and even further if apple juice was used. The different sorts of bios (vitamin B₁, etc.) are incapable of increasing the yeast produced and the same applies to heteroauxin. The actual amount of yeast depends on kind and species of yeast and not on the amount originally present. More yeast is produced at a low temperature, e.g. 14° C., than at a high one, 24° C. The cultures were made in funnel-shaped vessels of 11 litre capacity. If wine makers ever decide to renounce the use of processed yeasts and to use instead the selected yeast from the must, they will need much greater quantities of yeast and the yeast culture vessels such as are now used in breweries will have to be utilized. The culture production of yeast for nutritional purposes is also discussed, but the difficulty here is the cost of raw materials. In brewing and wine-making all the initial ingredients are present as by-products, but if the sugar, the grape juice, etc., all had to be bought purely for the purpose of yeast-making, the cost of production would be excessive.

1120. EIDT, C. C. 664.8.047
Review of dehydration in Canada. *Canad. Fd. Packer*, 1942, 13: 4: 17.
The results of work in Canada and England on the dehydration of food products, intensified on account of war conditions, has been pooled and tentative methods have been developed. Four vegetable products tested at Kentville, Nova Scotia, on a laboratory scale were potatoes, carrots, turnips and cabbage. Very high percentages of vitamin A, B and C were retained and palatability, structure and appearance of the refreshed product equalled that of freshly cooked vegetables. Five commercial plants are now being set up in Canada. Eight pounds of potato, 11 of carrot and turnip and 17 of cabbage make one lb. of their respective dried products. Under average conditions the product should store well for 2 years and withstand poor conditions for an appreciable time. Ten dehydrators are now operating their new methods in Canada in the case of fruit. Intensive research still continues on both vegetables and fruit drying.

1121. TRESSLER, D. K.

613.2: 664.85.047 + 664.84.047

Nutritive value of dried and dehydrated fruits and vegetables.

Tech. Bull. N. York St. agric. Exp. Stat. 262, 1942, pp. 44, bibl. 118.

An introductory account is given of commercial dehydration processes for various fruits and vegetables. None of the literature examined provided data of the effect of sun-drying and dehydration processes on the availability of protein of fruits. The percentage of protein in fruit is small, from 3% to 5%. Sun-drying but not dehydration in moving air currents is destructive of carotene in a number of fruits, e.g. figs, raisins. If anything, sulphuring assists in the retention of carotene. Dehydration of unsulphured fruits causes loss of one-third to one-half of their thiamin while sulphuring causes loss up to 100% during dehydration. Lye dipping before dehydration causes no loss. The thiamin content of fruit generally is not important. Both sun-drying and dehydration without sulphuring cause severe loss of ascorbic acid. To obtain nearly complete retention of vitamin C in fruit it is necessary to inactivate the oxidizing enzymes either by sulphuring or by rapid heating and then dehydrate in absence of direct sunlight. Spray drying at temperatures high enough to inactivate the oxidizing enzymes or rapid dehydration on heated drums or rolls cause little destruction of ascorbic acid. Sun-drying may cause considerable loss of riboflavin as it is sensitive to light, but there should be little or no loss from dehydration in the dark. Data concerning this are scarce. Fruits contain almost no antirachitic vitamin D. Information of a similar nature is given in the case of vegetables. The results obtained by various writers are reported.

1122. CHACE, E. M., NOEL, W. A., AND PEARSE, V. A.

664.85.047 + 664.84.047

Preservation of fruits and vegetables by commercial dehydration.

Circ. U.S. Dep. Agric. 619, 1942, pp. 46, bibl. 100.

Report of an investigation undertaken to determine certain physical principles and their application to dehydration in general. Factors leading to the deterioration of dehydrated products are not considered. The report covers dehydration plant, selection and preparation of material, pretreatment, drying, curing, insect pest control, packing, storing. Brief notes are given on the treatment to be accorded to different kinds of fruit and vegetables, together with data on waste and yield. Where the information provided is scanty, e.g. insect control, reference is made to suitable literature. A summary of the unrevised edition (1941) appears in *Food Manuf.* 1942, 17: 37-8; *H.A.*, 12: 681.

1123. ANON.

664.85.11.047

Drying apples.

Agric. Gaz. N.S.W., 1942, 53: 90.

All mid-season and late apples may be used for drying in Tasmania. The fruit is peeled, cored and sliced into rings by machinery, exposed to sulphur fumes (1 lb. sulphur to 200 cubic feet of space) for 30 minutes and dried in an evaporator. Little time elapses before the cut fruit is in the sulphur chamber. In dealing with small lots which cannot be sulphured immediately the cut fruit should be placed for not more than 20 minutes in a weak solution of salt and water, just sufficiently strong for the salt to be tasted. Though usually dried in an evaporator, in hot dry districts apples can be sun-dried. Instructions for this are given.

1124. BALLANTYNE, J. A.

664.85.25.047

The drying of peaches.

Agric. Gaz. N.S.W., 1942, 53: 89-90.

Peaches are not ready for drying until the eating ripe stage. They must, however, be picked rather earlier, though not till mature, and ripened in boxes for a few days. Pits are removed by hand, cutting cleanly down the line of the suture. The pitted fruit is put cut side uppermost on wooden drying

trays and placed in the sulphuring chamber. Methods of burning the sulphur are described. The limit of legal tolerance is 14 grams of sulphur dioxide per lb. of dried fruit which is barely sufficient to keep the fruit without colour deterioration in moist packs, since dissipation of SO_2 increases as the moisture content of the sample rises. Exposure to burning sulphur fumes for 6 hours is necessary, the rate of burning for the period being 8 lb. of sulphur per ton of fresh fruit. Fruit is ready for removal if the skin readily slips from the fruit when the latter is taken up between the thumb and forefinger. In drying, the best samples are produced by two-thirds drying in the sun and finishing in the stack. Watering of overdried fruit can cause much loss through discoloration and should not be practised. The difference between dry and over-dry fruit is only 2% to 3% of total weight.

1125. CRUESS, W. V., AND SUGIHARA, J.

664.85.3.047: 664.85.3.035.5

Dried citrus fruits for marmalade.

Food Manuf., 1942, 17: 153-4, reprinted from *The Canner* (undated).

Experiments are described in which the drying of citrus fruits in California reduced the bulk fivefold for export to England for conversion into marmalade. Three methods were tried:—1. Thin slicing of citrus fruits, including Valencia oranges, and drying on monel screen trays at 150° F. to bone dryness, i.e. until brittle; 2. steam blanching on screen trays for 6 minutes before drying; 3. exposing to burning sulphur fumes on wooden slat trays for 30 minutes before drying. The sulphured fruit had the most attractive colour. Drying took from 2½ to 3½ hours. Peel was also dried in 2½ hours after cutting into narrow strips. The resulting marmalade after cooking is of the Golden Shred type, i.e. clear jelly with strips of peel suspended therein. A recipe is given for making it.

1126. FISHER, C. D., MRAK, E. M., AND LONG, J. D.

664.85.047

Effect of time and temperature of sulfituring on absorption-retention of sulfur dioxide by fruits.

Fruit Prod. J., 1942, 21: 175-6, 199-200, 217, 219, 237-8, bibl. 10.

Controlled experiments carried out in California show that cut fruit such as apricots, peaches and pears as a rule absorb less sulphur dioxide during sulphuring, but retain more after drying when sulphured at a relatively high temperature such as 120° F. The extent of this temperature effect varies considerably with the length of the sulphuring period, nature of fruit and the locality in which it is dried. Cut fruits sulphured at 120° F. generally retained a better colour due in part at least to the greater retention of sulphur dioxide. The manner in which high sulphuring temperatures cause fruit to retain sulphur dioxide for longer periods is not understood but it undoubtedly involves physical as well as chemical changes. [From authors' summary.]

1127. JACOB, H. E.

634.873-1.547.6

The relation of maturity of the grapes to the yield, composition and quality of raisins.

Hilgardia, 1942, 14: 321-45.

Thompson Seedless and Muscat of Alexandria grapes, picked at about weekly intervals, were dried according to several methods. The stage of maturity is represented by degree Balling of the juice from the fresh grapes. The Thompson Seedless tests covered a range of 18° to 29° and Muscat 16° to 27°. Drying ratio varied inversely with maturity of the fresh grapes. With Thomson Seedless the product of Balling degree \times drying ratio remained nearly constant but with Muscat it drifted upward with the Balling. The size of the raisin berries and the weight per unit volume of raisins in both varieties increased along with the maturity of the grapes. During the early part of the range of maturity studied, the sugar content of the raisins increased whereas the total acid and insoluble solids decreased. Changes in

the sugar and insoluble solids content nearly or quite ceased near the mid-point in the range of maturity but the acid continued to decrease slowly. The potassium, calcium, and magnesium content of the Thompson Seedless raisins remained fairly constant but phosphorus appeared to decrease with advancing maturity. In the Muscat the potassium and phosphorus decreased, with calcium and magnesium remaining about the same. H.E.J.

1128. HUSSEIN, A. A., MRAK, E. M., AND CRUESS, W. V. 634.873

The effect of pretreatment and subsequent drying on the activity of grape oxidase.

Hilgardia, 1942, 14: 347-57.

Experiments were conducted to determine the effect of various dipping, sulphuring and drying procedures on oxidase activity in grapes. The commercial cold-, mixed-, and soda-dip treatments decreased the oxidase activity when immersion periods of sufficient length were used. Oxidase activity was stimulated by very short, soda, mixed and hot-water dips. Sulphuring decreased the oxidase activity approximately in proportion to the period of exposure and concentration of SO_2 used during sulphuring. Raisins prepared by dehydration had about one-fifth the oxidase activity of sulphured grapes dried in the shade. E.M.M.

1129. BISSON, C. S., ALLINGER, H. W., AND YOUNG, H. A. 664.85.047

Some factors affecting the burning of sulfurs used in sulfurizing fruits.

Hilgardia, 1942, 14: 359-72.

Chemical tests showed that when sulphur used in fruit-drying burned poorly this was due to small amounts of carbonaceous impurities which formed a black film over the burning surface, gradually putting out the flame and resulting in under-sulphured fruit and loss of sulphur. In laboratory and field tests small amounts (one to 50 parts in 10,000) of various organic materials were added to high grade sulphur and the mixtures burned. Among many materials tested the petroleum oils and turpentine produced the largest film formation and the greatest reduction in sulphur burned (up to 95%) whereas the cellulose materials had the least effect. The smaller amounts of added impurities produced proportionately much greater reduction in burning than the larger amounts. In field tests the sulphur burned much less (4 to 20 times) than in the open laboratory, due, doubtless, to limited access of air and accumulation of SO_2 in the sulphuring chamber. H.W.A.

1130. SUGIHARA, J., AND CRUESS, W. V. 664.84.047

Rapidly refreshing dehydrated vegetables.

Fruit Prod. J., 1942, 21: 239-40.

Experiments were undertaken to determine how rapidly dehydrated vegetables could be cooked without preliminary soaking. Blanched vegetables compared with unblanched were equal or superior in colour, odour and flavour. The rate of cooking was greatly assisted by blanching. A fifteen-minute blanch was the optimum length of time for the most rapid recovery and with the exception of potatoes and peas all blanched vegetables could be cooked in 15 minutes without presoaking. Enzymic activity was significantly noticeable in unblanched dehydrated vegetables soaked overnight and rendered them tough after cooking. Unblanched vegetables which had been steamed for 2 minutes before overnight soaking were much more easily cooked and gave a tender product.

1131. CRANG, A. 664.85 + 664.84

Notes on domestic fruit and vegetable preservation.

A.R. Long Ashton agric. hort. Res. Stat. for 1941, 1942, pp. 125-30.

The author usefully discusses the following subjects:-

(1) Factors affecting the keeping quality of jam. (2) Relative

pectin and acid contents of the different parts of citrus fruits. (3) Jam recipes from wild fruits and rhubarb. (4) Rose hip products—the syrup being the most satisfactory. (5) Fruit and vegetable drying.

1132. SILLS, V. E. 635.937.34: 577.16

Investigation on the use of rose hips as a source of vitamin C. I. A review of the existing literature.

A.R. Long Ashton agric. hort. Res. Stat. for 1941, 1942, pp. 110-7, bibl. 19.

What emerges from this article is the great value of rose hips as a source of vitamin C, the great variation between rose species in this respect and sometimes between different specimens of the same species, the considerable variation in value according to different methods of drying and storing and the fact that there are a number of ways of preparing rose hips whereby the vitamin C content may become available in palatable form for human consumption. Exact information is, however, somewhat meagre.

1133. SCHÄFER, E. 634.1/8: 577.16

Obst und Vitamine. (Fruit and vitamins.)

Landw. Jb. Schweiz., 1942, 56: 289-314, bibl. 14.

Figures are given of the content of vitamins A, B_1 , B_2 , and C in a large number of foodstuffs including fruits and of the vitamin C content of 65 varieties of apple as determined by different named authorities. The following notes are from the author's summary. Vitamin A, or rather its precursor β -carotene, is present only in small quantity in fruits. Apricots contain more than apples and may show up to 2.1 mg. per 100 g. fruit. Cooking and preservation in a fresh state result in only small loss. Vitamin B_1 and B_2 are both very scarce in fruits, nuts containing more B_1 than other fruits. Vitamin C varies greatly in its incidence in fruits, namely from 0.7 to 38.7 mg. per 100 g. It can be increased considerably by cultural measures such as pruning to give more light, manuring, picking at particular stages of maturity, and different storage treatments affect its loss. Cooking results in loss varying according to the method of cooking. Acid apples and apples baked in their skins lose least vitamins. Vitamin C keeps well in canned fruit sterilized in syrup. Drying results in heavy loss.

1134. PYKE, M. 577.16: 635.34 + 635.126

Effect of shredding and grating on the vitamin C content of raw vegetables.

Nature, 1942, 149: 499.

The effect of grating with cheese grater or shredding with suet shredder on both savoy cabbage and swede was considerably to lessen the vitamin C content. On the other hand shredding with a sharp knife did not significantly affect it.

1135. BOOTH, V. 577.15.04: 635.3

Vitamins in grass.

Chemistry and Industry, 1942, 61: 255-6.

This short article is an abstract of a contribution to the symposium on green leaves as a source of protein and other nutrients arranged by the Nutrition Panel of the Food Group of the Society of Chemical Industry, February 11, 1942. The amount of the various vitamins available in a representative average of mixed grasses grown in Britain in June is tabulated in mg. vitamin per 100 g. together with the daily needs of an adult man and the amount in grams of grass necessary to supply each daily need. The figures are approximate. One to 2 kg. of fresh grass daily would be needed to supply the vitamin B complex, a quantity which it is felt even an enthusiast might have some difficulty in assimilating. Were grass processed along the lines described by Pirie* for the extraction of protein certain vitamins might be recovered as by-products. Ascorbic acid, in which grass is rich, could scarcely be successfully obtained because of its rapid oxidation under maceration and the fact that

* *Ibidem*, 1942, 61: 45-8, H.A., 12: 676.

pre-treatments for the destruction of the oxidase would interfere with the recovery of the protein from the grass juice. Carotene could be recovered to a quarter of its total and might be used in colouring margarine, as a substitute for synthetic dyes of no nutritive value. At this rate of recovery 100,000 tons of grass would have provided enough carotene to add 0.6 mg. to each ounce of the present margarine ration during January, February, and March. Since carotene is absorbed into the digestive tract more easily from an oily substance than from green leaves the increased absorption would largely compensate for the low recovery of carotene from grass. The 0.6 mg. per oz. of carotene would colour margarine to match butter and would supply one-tenth to one-fifth of the daily requirement.

1136. LEHMANN, E., AND WILKE, S.

633.491-1.56: 633.5

Untersuchungen zur Gewinnung von Zellstoff aus Kartoffelkraut. (The processing of potato haulms for cellulose.)

Landw. Jb., 1940, 90: 651-96, bibl. 4.

The older method of treating potato haulms for the extraction of cellulose with caustic soda as well as two new methods using nitric acid and sodium sulphate respectively are described. The nitric acid method gives much the best results both quantitatively and qualitatively. The most satisfactory results are obtained from ripe haulms which are just starting to die down.

1137. BOIS, E., AND CHUBB, W. O.

634.972.6: 581.192

The sap of the birch tree, *Betula papyrifera* Marsh. I. The amylase system.

Canad. J. Res., 1942, 20, Sec. B, pp. 114-20, bibl. 29.

New facts are provided which throw some additional light on the constitution of starch. It is thought that birch sap might serve as a source of cellobiose, which has hitherto only been prepared commercially by hydrolysis of cellulose acetate. [From authors' summary.]

1138. DAVIS, W. B.

634.3: 581.192

The distribution and preparation of citrus peroxidase.

Amer. J. Bot., 1942, 29: 252-4, bibl. 7.

The distribution of peroxidase in different tissues of orange, grapefruit, lemon and tangerine is described, and the high activity in the inner seed coat of these fruits, especially tangerines, is pointed out. Hand-removed seed coats gave the highest activity in crude preparations. That it may be possible to make peroxidase on a large scale is indicated from experiments with lemon seeds, which are available in quantity. [Author's summary.]

1139. BONDI, A.

634.3-1.563.5

The ensilage of citrus fruit pulp [in Palestine].

Emp. J. exp. Agric., 1942, 10: 89-92, bibl. 5.

The material ensiled was orange pulp and grapefruit pulp discarded as waste by a fruit juice factory. The orange but not the grapefruit is first freed from essential oils by mechanical means. The experiments carried out by the Rehovot Research Station were on a small scale in barrels and on a large scale in a cement tower. The barrels contained each about 300 kg. of pulp, tightly pressed down and covered with paper, straw and finally earth. It was found that minced pulp could be successfully ensiled without the addition of any preservative and is definitely superior to unminced pulp which packs more loosely. The changes in chemical composition of the material during ensilage are of interest and are tabulated. The only difference noted between the small and large scale silage was that the pH of the latter dropped more markedly with consequent larger loss of sugar and the formation of greater quantities of acetic and lactic acids. Both silages were practically free from butyric acid.

1140. BONDI, A., AND MEYER, H. 634.3-1.563.5

The digestibility of citrus feeds.

Emp. J. exp. Agric., 1942, 10: 93-5, bibl. 3.

1. The digestibility coefficients of fresh orange culms and of citrus-pulp silage have been determined in experiments on sheep. 2. Attention has been directed to the importance and high digestibility of the N-free extract of fresh and silaged citrus feed. [Authors' summary.]

1141. DEIJ, W. B.

633.72: 581.192

De bepaling van caffeine in thee. (The determination of caffeine in tea.) [English summary 7 lines.]

Arch. Theecult. Ned. Ind., 1941, 15: 167-70, bibl. 4.

Of the two methods studied that of Van Romburgh and Nanninga was found to be more reliable than that of Fleusino Cortes.

1142. MESTRE (ARTIGAS), C., AND CAMPLONCH (ROMEU), I. 663.2

La produccion de aldehidos en la fermentacion de mostos sulfitados y su influencia en los vinos. (The production of aldehydes in the fermentation of sulphited musts and their effect on the wine.) [English and French summaries 1/2 each.]

Bol. Inst. nac. Invest. agron. Madrid, 1942, No. 6, pp. 1-16, bibl. 20.

HUMMEL, M. E. 577.16: 664.84 + 664.85

Factors in processing which affect the ascorbic acid content of fruit and vegetables.

Fruit Prod. J., 1942, 21: 273-5, bibl. 44.

TOEMO (IBARRA), H. P. 634.87: 663.813: 577.16

Acido ascorbico (vitamina C) en 26 muestras de jugos de uvas. (Vitamin C in 26 samples of grape juice.)

Reprinted from Rev. Fac. Agron. Montevideo No. 25, 1941, pp. 7, bibl. 10.

MINISTRY OF AGRICULTURE, LONDON.

664.85.035.5

Jam-making at preservation centres.

Tech. Comm. Minist. Agric. Lond. 5, 1942, pp. 8.

READ, F. C. E. 664.85.035.5

The manufacture of jam and marmalade in wartime.

Food Manuf., 1942, 17: 116-7.

SEDKY, A., FELLERS, C. R., AND ESSELEN, JR., W. B. 664.85.31.035.5

An improved orange marmalade of high vitamin C content.

Fruit Prod. J., 1942, 21: 170-2, 185, 189, bibl. 6.

DEIJ, W. B. 633.72: 581.192

Over het chemisme van de fermentatie van thee. III & IV. De fermenten in theeblad. (The chemistry of the fermentation in tea. III and IV. In the leaf.) [English summaries 1/2 p. and 1 1/2 pp.]

Arch. Theecult. Ned. Ind., 1940, 14: 129-38, bibl. 4 and 1941, 15: 235-62, bibl. 11.

See also *Ibidem* 1940, 14: 26 and 14: 82, noted H.A., 11: (248).

LENIGER, H. A. 633.72-1.56

Onderzoek naar den invloed van fermentatie op de kwaliteit van thee. (Investigation on the influence of fermentation on the quality of tea.) (English summary 2 1/2 pp.)

Arch. Theecult. Ned. Ind., 1941, 15: 171-212, bibl. 18.

KOO, E. C. 633.85-1.56

Expression of vegetable oil. A general equation on oil expression.

Industr. Engng Chem. (Industrial Edition), 1942, 34: 342-5, bibl. 12.

NOTES ON BOOKS AND REPORTS.

1143. KLOTZ, L. J., AND FAWCETT, H. S. 634.3-2.3/4

Color handbook of citrus diseases.

University of California Press, Berkeley and Los Angeles, 1941, pp. 90, including 40 plates, price £3.50, Cambridge Univ. Press, London, 21s.

This handbook describes and illustrates more than 100 diseases and disorders of citrus trees and fruits. It consists of 40 plates, prepared from coloured photographs, beautifully reproduced "comprising 108 illustrations in which all the important and most of the minor effects of 76 maladies are shown", each plate is accompanied by a leaf of descriptive text. The plates and the corresponding descriptions are collected as "loose leaves" in a stout cover with spring clips, so that any one of the plates can readily be taken out and replaced as required. It is essentially a handbook and its purpose is "to provide citrus growers, packing-house men, horticultural inspectors and extension workers with a ready means of identifying the various diseases that attack citrus"; the descriptions are therefore very brief, but sufficient, with the illustrations, for diagnosis and the remedies, when known, are given. It comprises diseases caused by fungi, bacteria and viruses and includes also a number of "deficiency" disorders as well as injuries caused by the incautious application of fungicides and insecticides.

H.W.

1144. SEGAL, L. (editor).

41.3: 91.7=2

New complete Russian-English dictionary. (New orthography.)

Lund Humphries & Co., London, 1942, pp. xii + 965, 42s.

A new Russian-English dictionary appears at an opportune time when more and more attention is being directed towards our Russian allies. This dictionary is a general one but the horticulturist with a working knowledge of the language will find that very few words used in Russian publications on horticultural science are missing. Thus on a casual glance the equivalents of such words as graft, cleft-grafting, shield-grafting, to inarch, placenta, peltate, cyme, were noticed. As a test an article on the sterilization of the soil of hot-beds was read with the dictionary at hand. The only words not found were a few of which the meaning was obvious from their derivation or the context, and certain scientific terms that were readily recognized by their phonetic equivalents. The chief feature that strikes one is the clearness of the type, one result of the use of rather thick, opaque paper. The volume is thus a heavy one, but as it is meant for the library table and not for the pocket this is no disadvantage and the increase in clearness is definitely in its favour.

H.W.

1145. COLONIAL OFFICE, LONDON (TEMPANY, H. A.)

63(729)

*Agriculture in the West Indies.**Publ. Colonial Office Colonial No. 182, 1942,* pp. 280, 10s.

EVANS, G. -

*West Indian agriculture.**Nature*, 1942, 149: 626-30.

A questionnaire on agriculture was issued by the recent West India Royal Commission (1938-9). The answers were examined and the information in them together with material from recent reports has been collected in concise but very readable form in this publication. After briefly sketching the historical background against which agriculture has developed in the islands Dr. Tempany deals in separate chapters with the most important aspects of agriculture in each colony. Photographs enliven the picture and maps help to sustain the clarity of the text. Each chapter with its list of contents and references affords an encyclopaedic account of the agriculture of a particular colony. The

whole is rounded off with chapters on agricultural education in the West Indies as a whole, on intra-colonial agricultural organization and on the general conclusions which can fairly be drawn from the data here collected. Finally statistics are given of: population and areas; imports of foodstuffs, timber, fertilizers, stockfeed, tobacco; exports of sugar, bananas, cocoa, spices, citrus, coconut products, coffee, rice-, arrowroot- and cassava-starch and of sea island cotton. It will undoubtedly be the standard reference book on the agriculture of the West Indies for many years to come until, in fact, the recommendations made by the Commission have been carried into effect. Sir Geoffrey Evans gives a most interesting summary of some of the most important facts brought out in this book.

1146. C.S.I.R. AUSTRALIA.

634.1/8+633.5+633.71+664.85

Fourteenth Annual Report of the Council of Scientific and Industrial Research for year 1939-40, 1941, pp. 102, 4s. 3d.

Horticultural investigations.—Laboratories have been erected at Huonville, Tasm., and at Stanthorpe, Qd. In the storage work in Tasmania it was again noted that, generally speaking, reduced fruit size was associated with a low incidence of all storage disorders. The advantages of prestorage treatment of apples with CO_2 were found to be doubtful and the practice is not recommended except perhaps for certain low acid varieties. The use of maleic acid either in dips or wraps was unsatisfactory but there were indications that dipping in a wax emulsion might increase the life of cool stored fruit. Proprietary box liners were unsatisfactory. The phenomenon of brown heart in gas-stored fruit was further studied. In Queensland most of the preparatory work for the apple and pear rootstock investigations was completed. Nursery trials are now planted with Jonathan on 14, Delicious on 5 and Granny Smith on 19 different rootstocks, set 2 ft. to 3 ft. 6 in. apart in rows spaced at 5 inches. Pear stocks of 4 types have been worked with Williams' and Packham's Triumph. Two field trials have been laid down. The first is to test Jonathan and Granny Smith on E.M. XVI, XII and I stocks, on Northern Spy and on seedling Pomme de Neige. A manurial trial is superimposed. The second trial is to test Jonathan on E.M. II, Ivory's Double Vigour and a local selection S4. A pruning trial will be superimposed. The use of intermediate stocks is being tested. In the Irrigation Areas investigations concerned with the maintenance of health and vigour of citrus were continued and further rootstock investigations were started. Studies of shoot and root growth were continued by means of root observation trenches.

The possibility of growing various *Drug Plants* is being examined (see next abstract).

Vegetable fibre investigations concern flax, *Urena lobata*, *Sida rhombifolia* and *Boehmeria nivea*.

Tobacco investigations concerned downy mildew and yellow dwarf diseases and the chemistry, physiology and smoking qualities of the leaf.

Irrigation Settlement investigations. A. Merbein. Maturity studies have made it possible to give highly satisfactory advice to vine growers with regard to the best dates of harvesting in recent years of seasonal abnormality. By the use of potassium linoleate as a wetter it was found that grapes could be dipped satisfactorily with reduced amounts of potash; other methods of making a little potash go a long way were examined. Cotton seed oil successfully replaced olive oil in the dips, and a casein paraffin emulsion with potassium oleate was found effectively to recondition sticky fruit for packing. Vine pruning studies are slowly showing the best methods for different conditions. In fertilizer trials nitrogen still proved the limiting factor in yield in the

Murray Valley soils. B. Griffith, N.S.W. An orchard survey is in progress on the Murrumbidgee Irrigation Area to determine numbers of different fruit trees and the effect on trees and vines of the different cultural and irrigation methods used. Citrus preservation trials included the use of borax baths and wax emulsions for use in marketing Navel and Valencia oranges, especially for the N.Z. market.

Fruit handling and storage investigations. (i) Citrus. Investigations continue in Sydney, Griffith, Melbourne and Adelaide on the following lines:—(1) To discover the causes of rind lesions appearing in low temperature storage; (2) to study the effects of various "sweating" treatments; (3) to determine the possibly parasitic origin of certain rind lesions and to study the factors governing the onset of *Septoria* spotting in orange; (4) to study processing of citrus fruits for the reduction of mould and improvement of the external physical condition of the fruit. (ii) Other fruits. (a) Apples. At Sydney the control of bitter pit in immature Granny Smith apples by pre-treatment with ethylene was again shown. Studies are being carried out of the effects on apples of applying more than 50 different protective coatings made from various oils, waxes and shellac under temperature conditions ranging from 32° to 70° F. At Melbourne optimum storage conditions are gradually being evolved for different apple varieties. A further season's experiments confirmed the previous finding that bitter pit in Granny Smith can be almost completely controlled by picking the apples sufficiently ripe and storing at once at 32° to 34° F. (b) Pears. Work at Sydney confirms previous findings that an atmosphere of 16% O₂ and 5% CO₂ increases storage life by about 50%. At Melbourne most of the work with pears has been carried out in atmospheres obtained by reduced ventilation. They show that continuous gas storage gives far better results than gas storage before or after a period of air storage. The best temperatures for after-ripening different varieties of pear are under investigation. (c) Plums. Work is in progress on optimum conditions for storing plums in transit for the London market. (d) Peaches. Work both at Sydney and Melbourne is directed towards the attainment of a longer storage life between tree and ultimate customer and different practices are being tested. (e) Grapes. The elimination of mould in packed grapes is receiving attention.

Fruit products investigations. Investigations on lacquering fruit juice tins have enabled the tin content in fruit juices to be reduced to a very low figure. [For other investigations in this field see next abstract.]

Entomological investigations. Investigations have been made into the solubility of nicotine—for use in codling moth control—in the presence of salts. A study of the mode of action of arsenicals has also been undertaken. Observations are recorded on the incidence of the oriental peach moth and of its parasite, *Macrocentrus ancylivorus*. The insect control of St. John's Wort (*Hypericum perforatum*), lantana (*L. camara*), noogoora burr (*Xanthium spinosum*), ragwort (*Senecio jacobaea*) and nut grass (*Cyperus rotundus*) is under investigation.

1147. C.S.I.R. AUSTRALIA.

633.5 + 633.71 + 634.1/8 + 664.85

Fifteenth Annual Report of the Council of Scientific and Industrial Research for year 1940-41, 1942, pp. 105, 4s. 9d.

Fruit investigations. (a) Apples. (a) In Tasmania. The Laboratory has been transferred from Hobart to Huonville in the middle of the apple area. Further experiments have been carried out on wax coatings for fruit. Work on brown heart has included trials with artificial atmospheres. The past season was characterized by low average temperature and drought. It is found that the salutary effect of borax, $\frac{1}{2}$ to 1 lb. per tree, will last at least 5 years. The reasons for a condition known as dimple have not been traced. The mathematical relation of percentage disorder and the chemical and physical properties of the fruit to the

average size of the fruit per tree (a measure of the leaf: fruit ratio) has now been established for 5 successive years. These results now form a basis for recommendations as to the best average size for several varieties and a background for the necessary thinning and crop control experiments to obtain this. The effect of delayed storage is found to vary considerably with different apple varieties. The relation of fruit physiology to keeping qualities and seasonal climate is still being studied and forecasts are now becoming available on which the storers can profitably make his calculations. As regards prestorage treatment coating the fruit appears to offer considerable commercial possibility provided over-maturity is avoided, especially for uncoloured varieties of apple. (b) In Queensland. At Stanthorpe rootstock trials concern pears on pear stocks, both clonal and *P. calleryana* seedlings, Delicious apple on local stocks, Malling XII and own roots. (ii) Citrus. Among investigations at Griffith and on the Murray River irrigation settlements are (a) testing of seed from several sources for the production of rootstocks, including jamburi from India, Japansche citron from Malaya and California rough lemon, (b) selection of plants derived from rough lemon, sweet orange and Seville orange root cuttings, also for rootstocks, (c) root studies under varying conditions, (d) inarching unhealthy trees, so far without success.

Vegetable fibres. The Stormont strains of flax tend to be superior to others. Stems of *Urena lobata* have passed cordage tests. Small scale trials are in progress on hemp, jute and the crotalariae. Samples of other fibre plants have been received for examination.

Tobacco. Investigations were continued on yellow dwarf, physiology and smoking qualities.

Drug plants. Investigations are in progress to determine the possibility of producing the plants which are the source of the following drugs:—hyoscine and hyoscamine, digitalin, strichnine, ephedrine, emetine, santorin, strophanthin and ouabaine, ergot, quinine and opium and its alkaloids.

Irrigation Settlement investigations. A. The Commonwealth Research Station, Merbein, is concerned mainly with problems of the dried fruit industry, those of soil preservation and reclamation and fruit processing being at present the most urgent. Notes are given of drainage and irrigation work and on fertilizer trials with sultanas. With regard to the technique of fruit processing it has been found possible to substitute cotton seed oil for olive oil in drying and to make a great reduction in the amount of potash used. Much of the ash used in dipping can now be got from burnt sultana prunings. The addition of 1% salicylanilide to the dip mixture helps to control mould on racks during drying. The importance of paraffin oil, casein, water emulsion as a wash for dried fruit has been amply proved, especially in cases of broken skin. Trials have been started on the possible use of low grade fruit to produce cream of tartar and alcohol. B. The Irrigation Research Station, Griffith, has been working, *inter alia*, on soil deterioration. In citrus preservation trials at Griffith it was found that wax emulsions applied to the skin reduced wilting in store. Other important factors were the position in case and the time of picking.

Fruit storage investigations. 1. At Sydney. Investigations have included peaches, plums, nectarines and pears and apples. Gas storage has yielded particularly good results with Jonathan. As regards citrus, actually Washington Navel, the effect of sweating is largely determined by the condition of fruit at the time of picking and sometimes it may actually increase subsequent rind disorders. Work is reported on skin coatings for fruits, the fruits being dipped into a solution or water-base emulsion of wax, oil or shellac. A technique has been evolved for testing the efficiency of such treatments. The effect is found to depend on the nature of the constituents in the coating, the thickness of the coat, the class of fruit, the temperature of storage and the maturity of the fruit at the time of picking. Good results were obtained for coated fruit both in cold and

ordinary store. 2. At Melbourne. Gas storage experiments on apples and pears are reported. The best control of mould in grapes has been the insertion of a tablet containing 15% sodium bisulphite and 4% spermaceti with each bunch in the paper wood wool pack or the treatment of the granulated cork used for packing with about 2.5 g. iodine per pound of cork.

Fruit products investigations. Notes are made of investigations on the following:—apple juice, including blending and clarification, apple butter, apple treacle, apple cider; pine-apple juice; citrus juice—Washington Navel were found to produce an excessively bitter juice, Parramatta oranges when properly ripe a very good juice, while grapefruit and lemon gave satisfactory products; passion fruit juice; grape juice—black and white muscats proved best; tomato juice; prune juice and blends thereof with lemon or with lemon and passion fruit; vitamins in citrus and other juices and the effect of processing on them.

Entomological investigations. Horticultural pests, work on which is reported, include the oriental peach moth (*Cydia molesta*), banana stem borer (*Cosmopolites sordidus*), pea weevil (*Bruchus pisorum*), cabbage butterfly (*Pieris rapae*) and insect vectors of virus diseases.

1148. BERMUDA. 633.491 + 635.25 + 635.944
Report of the Department of Agriculture, Bermuda, for the year 1941, 1942, pp. 12.

Experimental work included a spacing trial of Bliss Triumph potatoes. Twelve-inch spacing proved most suitable for the early crop. Trials were carried out with Early Sweet Spanish and Early White Spanish onion against the Bermuda onion. Differences were slight but the keeping quality of the Spanish was poor. Selection of Easter lily seedlings continued. Various pests and diseases are briefly enumerated including a Discomycete which proved to be a species of *Lamberella* new to science. Carrots treated with Brytene Wax Emulsion 333 B-O before shipment to Canada had a better appearance than and none of the fungous disease of unwaxed controls. Slow drying of the dipped carrots in the humid atmosphere of Bermuda was a drawback to be overcome, possibly by a drying machine.

1149. CARNEGIE INSTITUTION. 575/577 + 581.1
Annual Report of the Chairman of the Division of Plant Biology, Carnegie Institution of Washington, being reprinted from *Yearb. Carnegie Inst. No. 40 for 1940/41*, 1941, pp. 147-85.

Among results of recent research which have profoundly affected ideas on the mechanism of photosynthesis are (1) the redetermination of the efficiency or quantum yield of the process, which is now considered to be one-tenth to one-twelfth instead of one-fourth as was previously thought; (2) confirmation of the variability of the photosynthetic quotient, i.e. the ratio of the volume of CO_2 absorbed to that of O_2 liberated; and (3) the observation of the fact that many living cells can reduce CO_2 in the dark or at least incorporate CO_2 into pre-existing organic compounds. The problems of the mechanism of photosynthesis are being approached on various lines by the Institute especially in the following ways:—(1) Photosynthetic measurements are being applied to certain diatoms which appear to be somewhat aberrant in the compounds formed by their photo-synthesis; (2) radioactive carbon is being used to follow the fate of CO_2 from the moment of its absorption by the plant through its elaboration into organic compounds by photosynthesis; (3) the culture of albino, or chlorophyll-free, plants has been developed to determine what particular compounds are essential to the nutrition and development of the plant.

1150. NATIONAL INSTITUTE OF AGRICULTURAL BOTANY, CAMBRIDGE. 633/635
Twenty-first Annual Report of the National Institute of Agricultural Botany 1939/40, pp. 17, and *Twenty-second ditto 1940/41*, 1942, pp. 15.

Outstanding features in these two reports are the serious losses by death sustained in the past two years in the persons

of the first director of the station, Mr. W. H. Parker; his successor, Mr. M. A. Bailey; of the superintendent of the Potato Testing Station, Mr. H. Bryan; and of the technical assistant, Mr. B. Brandreth. In addition, Dr. E. S. Beaven, Chairman of the Council, of Plumage-Archer barley fame, died in the winter of 1941. The Ormskirk Potato Station was closed in 1940. The notes include brief information on varietal trials of flax, swedes, mangolds, linseed, brussels sprouts, onions, carrots, garden beets, turnips, parsnips, haricot and soya bean.

1151. RUBBER RESEARCH SCHEME, CEYLON. 678.11
Supplement to Report of the work of the Rubber Research Board in 1940, being *Report of the London Advisory Committee for Rubber Research (Ceylon and Malaya) for 1940*.

Imperial Institute, London, 1941, pp. 8.

A technical appendix, pp. 5-8, reports on investigations carried out in London on the elucidation of factors responsible for the technical behaviour of latex and on the fractionation and variability of caoutchouc.

1152. INDIA, IMPERIAL COUNCIL OF AGRICULTURAL RESEARCH. 633/635
Annual Report of the Imperial Council of Agricultural Research for 1940-1, 1942, pp. 190, 4s. 6d.

A comprehensive report on the work of the Council for the year under report. A summary of fruit research work is given on pp. 16-24. The notes which follow are taken from this summary. *Kodur, Madras*. Citrus rootstock trials. Provisionally reported that *jambeni* (rough lemon) is the most vigorous stock for sweet orange and acid lime. *Gajannina* produces equally vigorous plants for sweet orange but is subject to gummosis. Following these as stocks for sweet orange, grouped in descending order of vigour, are placed (1) *kichili*, limes, (2) *billikichili*, grapefruit, sour orange and *santra*, (3) sweet orange, pomelo. Lime rootstocks produce the smallest trees when budded to lime. The selection of vigorous seedlings in the nursery beds for stocks is unnecessary, since differences tend to level out within 18 months of planting. The Nakamura method of side-grafting mango (fully described *H.A.*, 1939, 9: 1428) was successful with scions obtained from a distance and cut three to five days previously. A cheap grading machine costing only Rs. 70 has been devised at Kodur. It will sort 3,500 to 4,750 chinee oranges per hour into 4 grades. *Krishnagar, Bengal*. Pruning guava bushes failed to increase yields. In manurial trials with bananas compost alone gave the best results. *Chaubattia, U.P.* September was the best month for budding and March for grafting fruit trees, with little difference between success percentages for the two methods in their respective months. Frameworking gave better results than topworking (presumably with apples). Electroculture experiments produced no differences in the treated trees in growth or yield. Sodium chlorate sprays controlled the grass, *Imperata cylindrica*. Para-dichlorobenzene used as a soil fumigant controlled apple root borer to a depth of 3 inches. *Montgomery, Punjab*. A list of synonyms of citrus rootstock varieties has been prepared with a view to standardizing nomenclature. *Kharna khatta* proved the superior stock for local Malta and *Santra* oranges and for grapefruit but with Malta blood oranges it was less successful and is not advised. As regards other citrus stocks *galgal* and *jullunduri khatti* produce only small tap roots, *galgal* and *mitha* produce longer lateral roots, while *galgal* is by far the most prolific bearer of fibrous lateral roots. *Sabour, Bihar*. The mango seems to be naturally a biennial bearer and some types may crop poorly several years in succession. Nevertheless orchard management can do much to regulate cropping. Without 3 ploughings a year the mango orchard has been found to deteriorate. The use of growth substances has been of assistance in the rooting of litchi cuttings. Controlled production of papaya seeds by artificial pollination

has been established as a practical method for reducing variation within a variety and the ratio of male to female or hermaphrodite plants. Sowing 3 seeds to a hole and subsequently thinning to one ensured the maximum number of productive plants in a plot. *Burnihat, Assam*. Five different indigenous citrus stocks have been raised for trial. Yellow disease occurred on citrus planted too high on the slopes or too low in the valley. Affected plants transplanted to normal and well-drained situations have recovered within 8 weeks. Horticultural Stations have recently been opened at *Tarnab, N.-W. F.P.*, *Sambalpur (Orissa)*, and *Hyderabad*. The San José scale survey in Kashmir recorded 20 different host plants. The incidence of the scale was directly proportional to the humidity of the area. Seedlings of apricot, cherry and almond were much infested, the grown trees being generally free. Imported apple and pear varieties also suffered heavily. Badly infested trees planted at Jammu (1,000 ft.) were clear of scale in a year, possibly through some lethal climatic factor. Comparative tests with insecticides resulted in favour of diesel oil emulsion 1: 5 dilution, though dilutions down to 1: 10 gave good results. Two local apples, Shandgundu and Phokhla, were highly resistant to woolly aphid. Sweet Cider and Northern Spy were totally immune. *Storage*. Many cold storage trials were carried out at Bombay and elsewhere and the results for various fruits are recorded. A scheme of research on canning of fruits and vegetables has been initiated in the Punjab.

1153. JAMAICA. 63
Annual Report of the Department of Agriculture, Jamaica, for the year ended 31st March 1941, 1941, pp. 24.

Phosphates and nitrogen benefited growth of citrus on the acid Inland Basin soils. Phosphates and potash brought citrus into first bearing earlier and increased yield. On *terra rossa* soils sulphate of ammonia proved detrimental, potash essential and phosphate uncertain. Banana Panama disease (*Fusarium oxysporum cubense*) is unaffected by the hypodermic injection of potassium permanganate or by any of the other alleged cures tested in the last few years. A localized non-infectious outbreak of fruit stalk rot (navel rot) is reported. Leaf spot (*Cercospora musae*) investigations were continued. A comparative test with bordeaux mixture and Perenox (fungicides in use by the Banana Leaf Spot Control Board) showed that bordeaux was the more effective in suppressing sporulation while dew taken from Perenox sprayed leaves is markedly more toxic to spore germination than dew from bordeaux sprayed leaves. Shade can effect a natural control by preventing the formation of dew which is the main source of free moisture necessary for sporulation of *C. musae*.

1154. STATION FÉDÉRALE D'ESSAIS VITICOLES ET ARBORICOLES À LAUSANNE ET DOMAINE DE PULLY (FAES, H.). 634.1/7 + 634.8
Rapports annuels 1939 et 1940. (Annual reports for 1939 and 1940.)

Ann. agric. Suisse, 1941, 42: 703-38.

The numerous investigational and advisory activities of the station are recounted here, among others the following:—The slow reconstitution of the vineyards of Valais on *Phylloxera*-resistant stocks. Attempts to find substitutes for bordeaux in the treatment of mildew which will require less copper. Those under examination include a proprietary article known as Cuprenox and other oxychlorides of copper. The results of trials indicate that the following apples merit more attention from growers in Switzerland, namely, Delicious, Statesman, Granny Smith and de Jaune. Selection work is in progress from crosses made for the production of late apple and pear varieties. Waxing of fruits as an aid to preservation is receiving attention and so far the process appears promising for varieties like Belle de Boskoop and Reinette de Canada, the skins of which tend

to wrinkle in store. Work on various diseases and physiological disorders is reported. Some of the latter are found to be amenable to boron applications to the soil. Reports are included of the work done by the Division of Chemistry and Bacteriology and by the Domaine de Pully. There is a list of publications by members of the staff in 1939 and 1940.

1155. MAINE. 633/5
Report of progress for year ending June 30, 1940, of the Maine Agricultural Experiment Station. *Bull. Me agric. Exp. Stat.* 400, 1940, pp. 185-294.

Sections are included among others on the following:—*Apple growing* (10 pages). Work is in progress on hardy stocks, particularly Virginia Crab and Hibernal, apple pests and diseases, manuring. *Canning and garden crops* (19 pages). *Potatoes* (22 pages). Costings, manuring, pests and diseases. *Small fruits* (4 pages). Strawberry breeding, the rest of the investigations in this section being on blueberry cultivation.

1156. MAINE. 634.11 + 633.491 + 634.73
Report of progress for year ending June 30, 1941, of the Maine Agricultural Experiment Station. *Bull. Me agric. Exp. Stat.* 405, 1941, pp. 401-535.

Among investigations of which reports are given here are the following—*Apples*. The application of hormone spray (Niagara Stik, a product of which the active ingredient is a sodium salt of naphthalene acetic acid) to McIntosh apple trees at the proper time resulted in a delay in fruit dropping. The saving due to retention on the tree up to optimum-picking date was about enough to pay for the material in 1940 and it is thought that in years of severe drop it might have practical value. Trials of hardy intermediate stocks for apple indicated that both good growth and hardiness in the scion variety followed the use of Virginia Crab for that purpose. A hardy stock nursery has been formed co-operatively to produce stocks for Maine nurseries. It will initially concentrate on the production of Virginia Crab. Notes are given of work on scab, the gypsy moth (*Lymantria dispar*), fruitfly (*Rhagoletis pomonella*). *Potatoes*. Considerable space (pp. 470-509) is devoted to potato investigations. *Small fruits*. Only the blueberry is dealt with (pp. 509-13). Work is reported on blueberry juice production, weed control on blueberry land, fruitfulness and mineral nutrition. Methods of controlling blueberry fruitfly (*Rhagoletis pomonella*) and thrips (*Frankliniella vaccinii*) are given. The successful use of kerosene emulsion for thrips (kerosene 24 pints, soap $\frac{1}{2}$ lb., water 24 gallons) is noted.

1157. PALESTINE. 634.3
Annual Report of Palestine Department of Agriculture for year ended March 31, 1941, 1941, pp. 15, 150 mls.

Although financial assistance was given to many citrus growers a reduced standard of cultivation has necessarily to be maintained. Yellowing of the foliage showed lack of manure and dead wood was prevalent as a result of shortage of irrigation and lack of pruning. Topworking of grapefruit with Valencia and Washington Navel and various mandarin oranges continued. The manufacture of various by-products showed progress. Citrus was fed to cattle at an average rate of 20 kg. per head per day. Horticultural studies were carried out at various stations on rootstocks for new citrus varieties, oil and pickling olive varieties, method of planting bananas, and plum rootstocks, topworking citrus and vegetative propagation of olives.

1158. SIERRA LEONE. 63
Annual Report of the Department of Agriculture, Sierra Leone, for the year 1940, 1942, pp. 10.

The agricultural policy laid down in the report for 1939 (H.A., 12: 332) is restated and the progress made under each section is related. The introduction gives an interesting account of the changes in social conditions brought about

by the war and these are all for the better. For the first time in recent history the non-farming population has been able to afford a standard of living satisfactory for normal nutrition.

1159. TANGANYIKA TERRITORY, DEPARTMENT OF AGRICULTURE. 633.73

Sixth Annual Report of the Coffee Research and Experiment Station, Lyamungu, Moshi, 1939, 1941, pp. 23, 1s. 6d.

Improvement of plant material. Of many hundreds of trees recorded over a number of years only 3 have been found to fulfil the requirements of the Station in regard to productivity, regularity of yield, "out-turn", compactness of bean and liquor quality. There are, however, a number which come near enough to these requirements to be classed as good. *Vegetative propagation.* The rooting of softwood cuttings is now the established method and experiments have been confined to trials with rooting media [reported in *Quart. Notes Coffee Res. Stat. Lyamungu, 1939, Nos. 9 and 11; H.A., 10: 261*]. In frequency distribution of yield trials 66% of the crop was given by 25% of the trees. 75% of the trees were therefore uneconomic. The provisional results or the objects of some 17 experiments in progress at the Station are briefly mentioned. The specialist officers present brief reports on their work.

1160. TRINIDAD AND TOBAGO. 63

Administration Report of the Director of Agriculture, Trinidad, for the year 1940, being Coun. Pap. No. 71 of 1941, Trinidad and Tobago, 1942, pp. 16, 12 c.

The report contains, apart from the usual crop and livestock details, brief notes by the technical officers of some of the experiments under their charge, and other matters of horticultural interest.

1161. TRINIDAD, IMPERIAL COLLEGE OF TROPICAL AGRICULTURE. 633/635

Report of the Governing Body and Principal's Report to December 31st 1941.
St. Augustine, Trinidad, and Broadway Buildings, London, S.W.1, 1942, pp. 23.

The report contains short notes from the heads of the various scientific departments on the work done and some of the results achieved. A list is given of scientific papers emanating from the College during 1941.

1162. WÄDENSWIL (MEIER, K.). 634.1/8 + 664.85

Bericht der Eidgenössischen Versuchsanstalt für Obst-, Wein- und Gartenbau in Wädenswil für die Jahre 1938/1939. (Report of the Wädenswil Horticultural Research Station for the years 1938 and 1939.)

Landw. Jb. Schweiz, 1942, 56: 97-168.

Short accounts are given of the activities of the Wädenswil station during 1938 and 1939. In nearly every case reference is made to separate articles on the subject in Swiss and other journals [many of which have been abstracted in *H.A.*—*Ed.*]. The first part (pp. 97-147) concerns investigations. 1. *Fruit growing.* Apple and pear rootstock trials. Variety tests and breeding, Lausanne being concerned chiefly with pear and Wädenswil with apple crosses. Pollination of fruit trees, mention being made here of Kobel's report summarizing 31 reports from different countries on pollination work presented at the 12th International Horticultural Congress, Berlin, 1938. [Not yet available in England, though attempts are being made to get copies.—*Ed.*] Manuring of fruit trees and investigations of fruit soils.

Diseases and pests. It is interesting that *Aphelinus mali* has become acclimatized in the Canton of Thurgau and appears each year in late summer, suffering no ill effects from winter spraying. Trials show that winter frosts entailing temperatures as low as -10°C . are unlikely to afford any measure of pest control. Investigations are reported into the insect fauna of the fruit cellar. Among 50 kinds the housemite (*Glyciphagus domesticus*) is very much in evidence. It feeds on fungi, but is responsible for introducing fungus spores especially those of *Gloeosporium*. Trials have shown that bees do no harm to fruit by puncturing and sucking. With a very soft fruit like the raspberry they may puncture the skin but only when the fruit is overripe owing to delay in picking. 2. *Fruit preservation and processing.* Fruit from very hard-pruned trees is found to keep badly, especially when the crop is a small one. Mere ringing does not appear to affect keeping quality but ringing combined with heavy thinning is found to be harmful. Fruit from ringed branches partially defoliated did not differ from that of the controls. The higher the leaf fruit ratio, the lower is the keeping quality of the fruit. Fruit subject to storage spotting should not be picked too late. Waxing fruits prevents shrivelling and has no effect on rot formation. Frozen pack methods are recommended and are being studied. Considerable work is reported on the clearing of fruit juices and on their concentration. Although it was found possible to check the growth of fungi and bacteria in fruit juice by the use of H_2O_2 , its use is not recommended owing to the flavour imparted by it. Storage of fruit juice under CO_2 pressure is under examination from the theoretical and practical standpoint. 3. *Viticulture.* Numerous attempts have been made to find a technique of treating bench grafts with growth substance solutions to obviate failure in the nursery, but so far little practical success has been achieved. Experiments are in progress on protection from spring frosts by oil emulsion sprays or by straw covers. 4. *Winemaking.* Considerable oenological work is discussed including experiments on currant and raspberry wines. 5. *Garden produce* (including flowers). Includes breeding and selection of primulas, small fruits, onions and other vegetables, cultivation of hydrangea, heath and early cichory, ecology and control of *Tarsonemus fragariae*.

1163. ZANZIBAR PROTECTORATE. 633.832 + 634.774

Annual Report of the Department of Agriculture, Zanzibar, for year ended 31 December 1941, 1942, pp. 4.

Cloves. Replanting cloves in areas affected by sudden death should be done between the old dying trees and the latter should not be removed until the young plants are well grown. The protection from wind and sun afforded by the dying trees has been found to ensure a healthy young plantation in a way that no other method has yet done. Similarly, if young trees are planted between the lines of healthy cloves and the latter gradually reduced year by year as the former develop, a new plantation can be obtained in a few years. Cost accounts show that very little difference to the profits will result during the period of transition. If clear felling has already been done artificial shade should be provided for newly planted cloves. *Gliricidia maculata* used as shade reduced casualties by half as compared with unshaded controls. *Shade.* Trials are in progress with *Gliricidia*, banana, sugar-cane, cassava and a mixture of *Gliricidia* and *Calopogonium*. The value of *Calopogonium* lies in its ability to check invasion of *Imperata* grass which has been shown to inhibit proper lateral and fibrous root development of clove. So far cloves up to seven years have failed to respond to manurial treatment. Experiments are continuing with nursery seedlings. Statistical analyses were made which determine the relationship of girth, canopy and yield for young cloves. *Pineapples.* Nitrogen increased the weight and close spacing the number of pinnes.

1164.

The following Proceedings and Annual Reports have also been examined:—

AMERICAN PHYTOPATHOLOGICAL SOCIETY.

Abstracts of papers accepted for presentation at the 33rd annual meeting of the Society, Dallas, Texas, Dec. 29, 1941-January 1, 1942.

Phytopathology, 1942, 32: 1-24.

Some hundred abstracts are given.

A.R. Dep. Agric. Basutoland for report year ended 30 Sept., 1941, pp. 12.

A.R. agric. Dep. Dominica 1941, 1942, pp. 4.

A.R. agric. Dep. Montserrat, Leeward Islands for 1940, 1942, pp. 5, 2d.

Reps. agric. Dep. Orissa, for 1936-37, pp. 35+46+4. Rs. 1-1-6; for 1937-38, 1940, pp. 103+2+5. Rs. 1-13-0; for 1938-39, 1941, pp. 103+2+5. Rs. 2-8-0.